

DS #:

4922

APN:

138-13-512-001

PROJECT:

Crystal Park Apartments

SUBMITTAL:

4th (no memo)

SCANNED BY/DATE:

CHECKED BY/DATE:





## LETTER OF TRANSMITTAL

TO: City of Las Vegas

DATE: 3/12/2018

ATTN: Albert Sung, P.E.

PROJECT: Crystal Park Apartments

W.O. NO.: 7844

BY MAIL: ☐

BY MESSENGER: ☒

PICK-UP: ☐

EXPRESS MAIL: ☐

FAX: ☐

FEDERAL EXPRESS: ☐

**No. Copies:**

**Description**

- |   |                                                                           |
|---|---------------------------------------------------------------------------|
| 1 | Addendum #3 to the Technical Drainage Studies for Crystal Park Apartments |
| 1 | CD containing the Technical Drainage Study for Crystal Park Apartments    |
| 1 | Check #052180 in the amount of \$400                                      |

COMMENTS:

**MATERIAL SENT FOR THE FOLLOWING REASONS:**

CHECKING: ☐

FILING: ☐

APPROVAL: ☐

YOUR FILES: ☐

OTHER: ☐

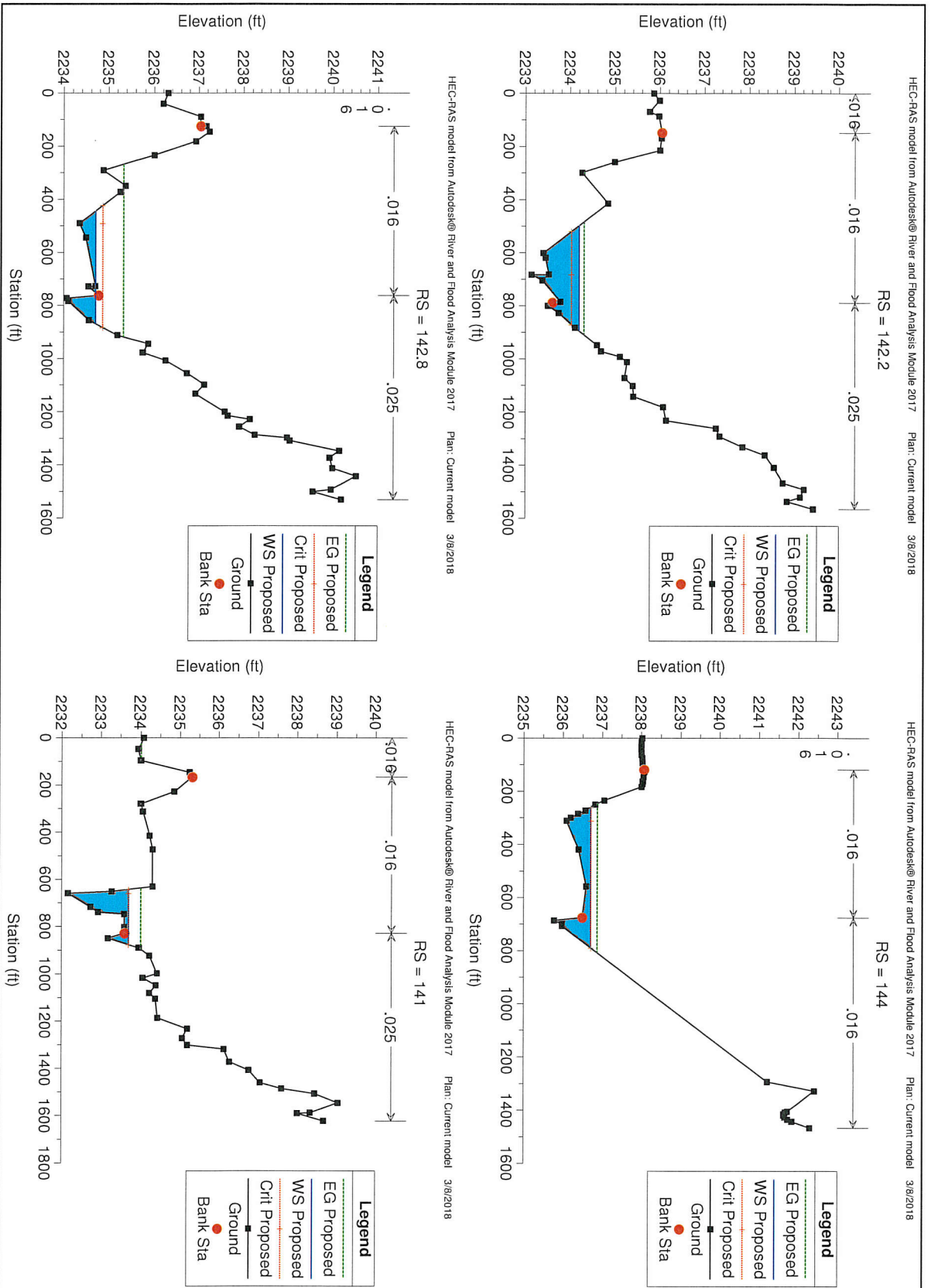
CC: ☐

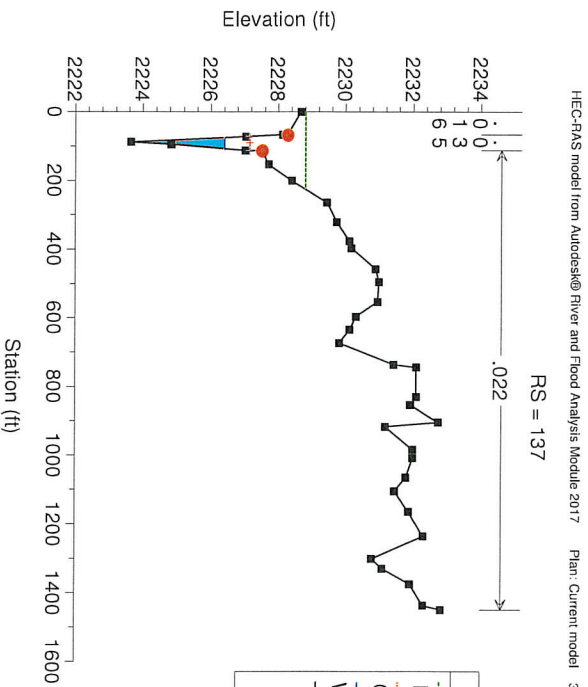
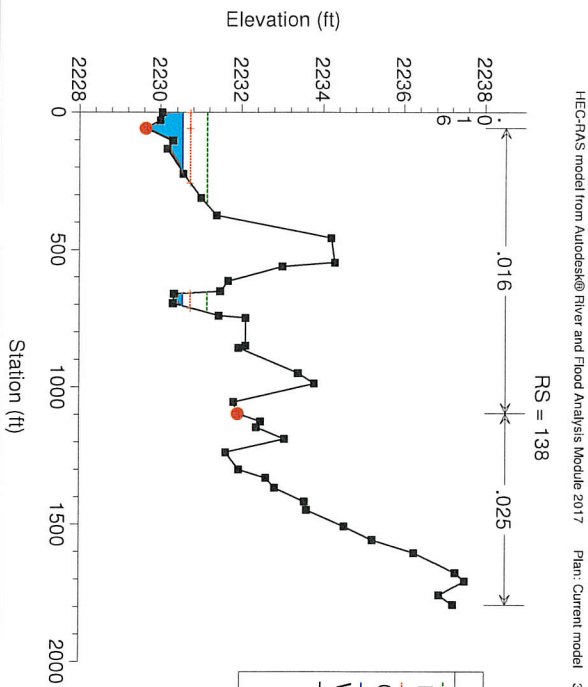
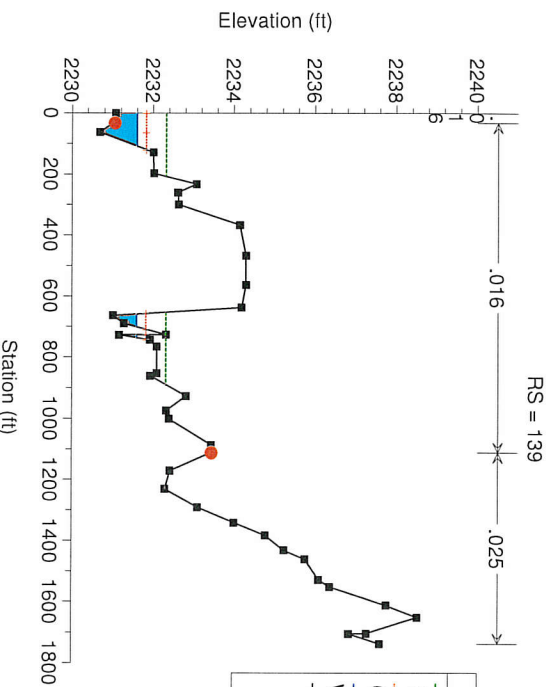
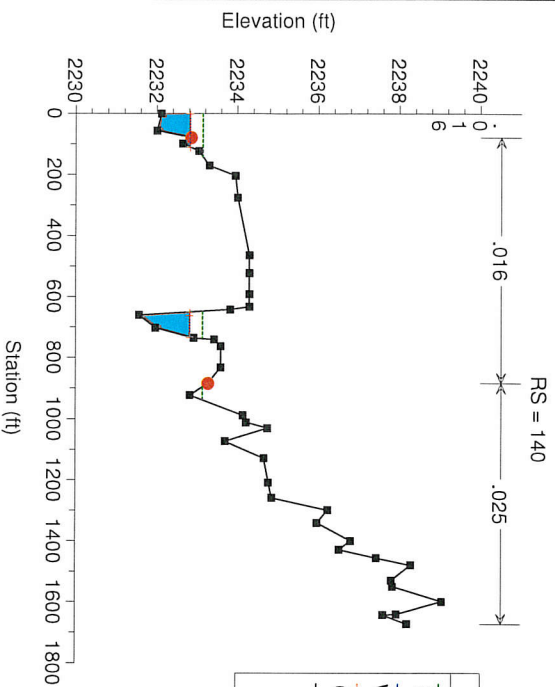
SENDER: William Meyer, P.E.

ABOVE MATERIAL RECEIVED BY:

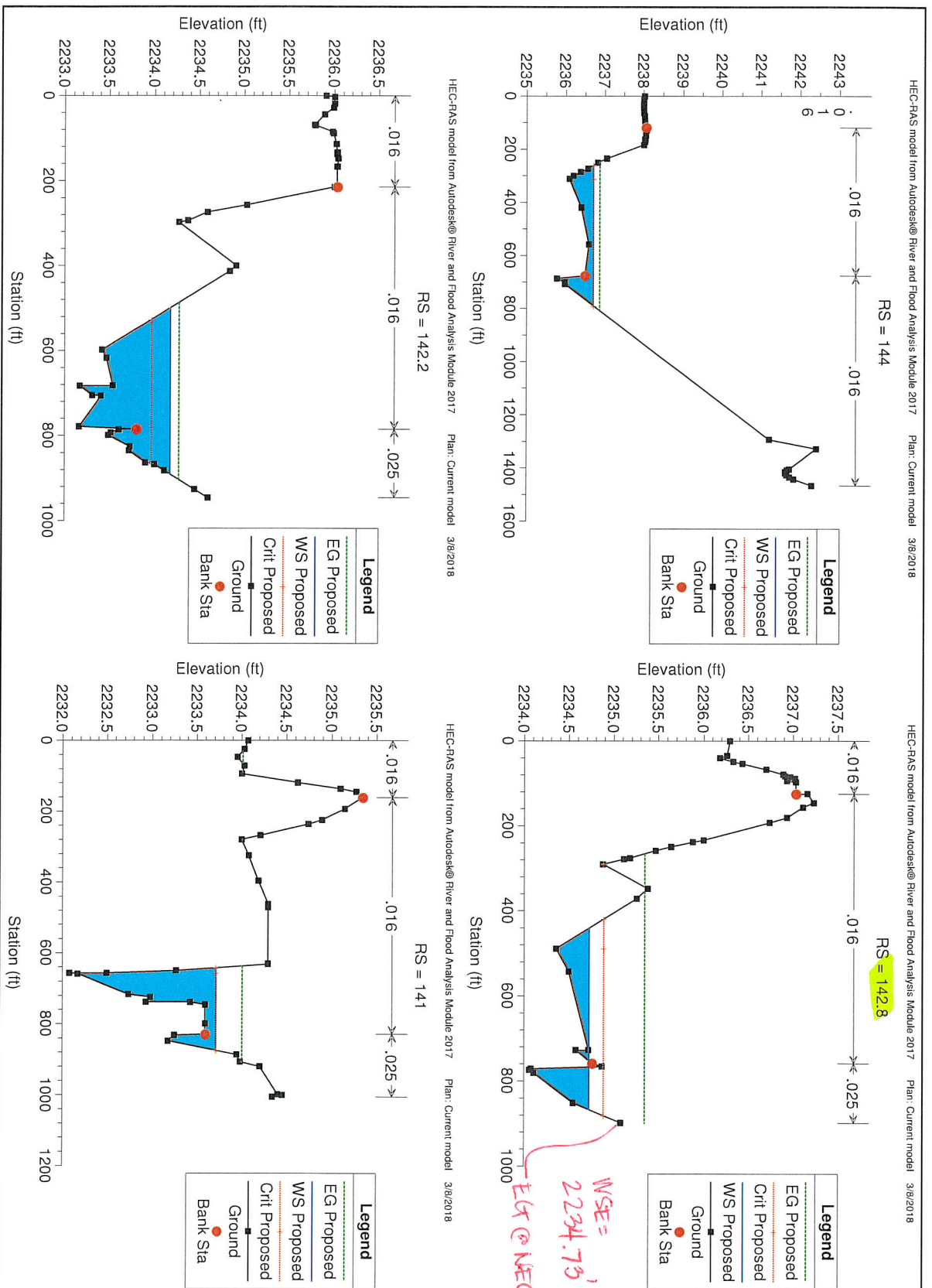


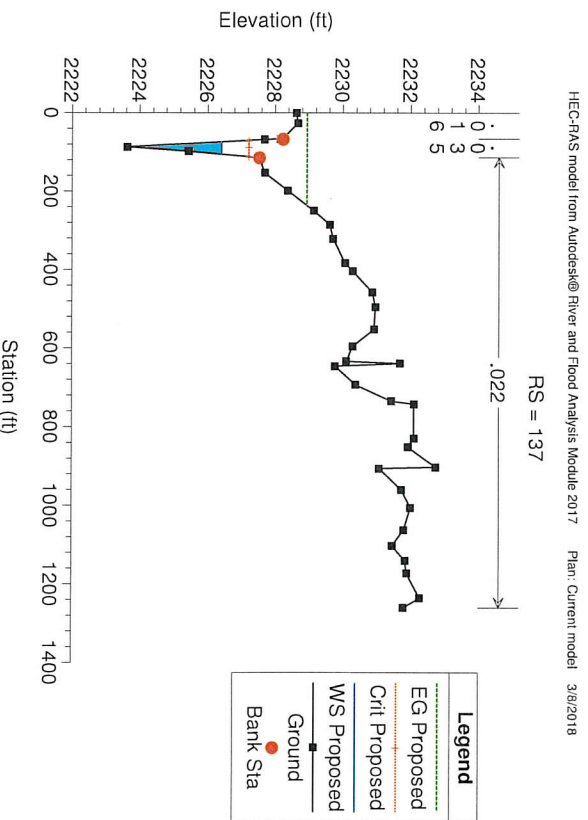
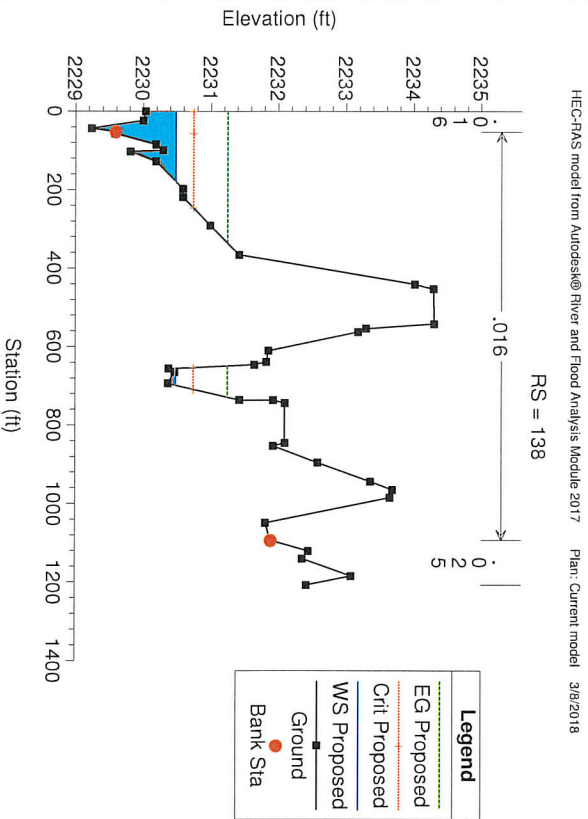
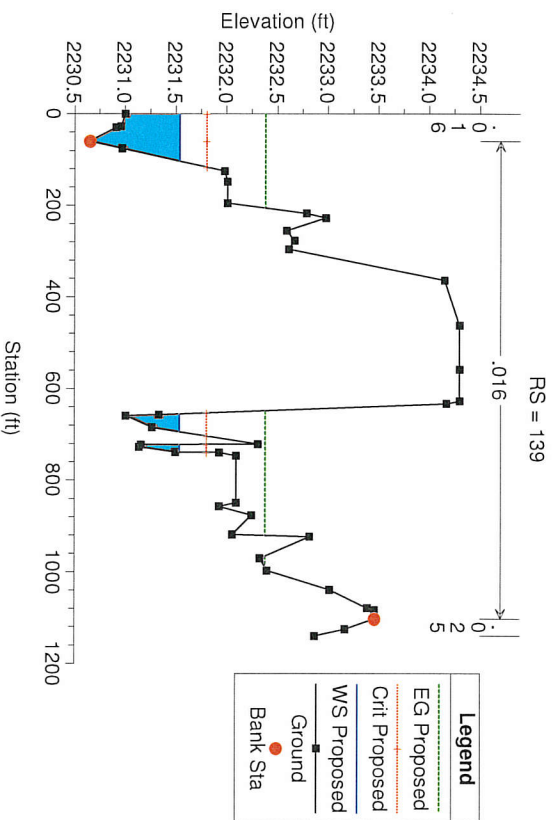
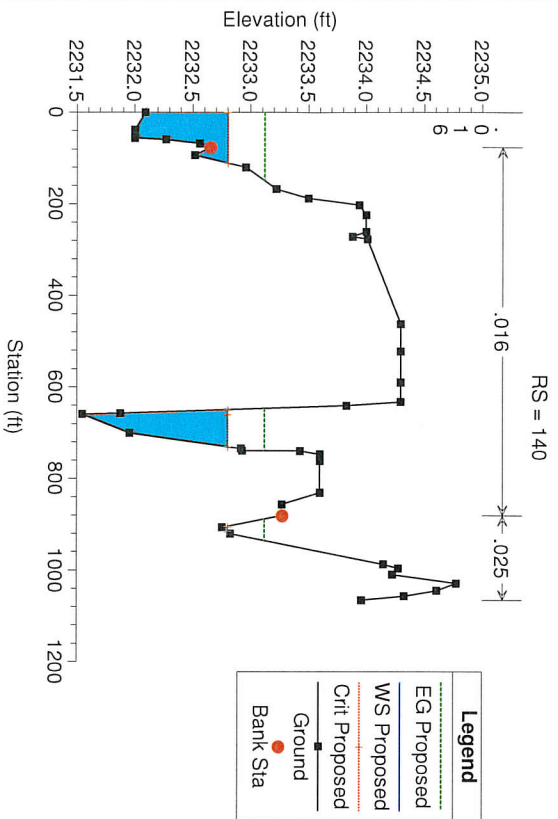
EXISTING  
(FROM CD)





Developer  
(from CO)





# Addendum #3 to the Technical Drainage Study for

## **Crystal Park Apartments**

*Las Vegas, Nevada*

W.O. # 7844

*Prepared for:*

EAB Investment Company  
3065 N Rancho #130  
Las Vegas, NV 89113

*Submitted to:*

City of Las Vegas  
Department of Public Works  
731 South Fourth Street  
Las Vegas, NV 89101





HYDROLOGIC CRITERIA AND DRAINAGE MANUAL  
**DRAINAGE STUDY INFORMATION FORM**

Name of Development: Crystal Park Apartments Date: March 08, 2018

Location of Development: a) Descriptive (Cross Streets) North/South: Michael Way  
East/West: Cheyenne Avenue

b) Section: 13 Township: 20S Range: 60E

c) APN : 138-13-512-001

Name of Owner: EAB Investment Company

Telephone No.: \_\_\_\_\_ Fax No.: \_\_\_\_\_ E-Mail Address: \_\_\_\_\_

Address: 3065 N Rancho #130, Las Vegas, NV 89113

Contact Person-Name: William Meyer Telephone No.: (702)-873-7550

\* E-Mail Address: bmeyer@vtnnv.com Fax No.: (702)-362-2597

Firm: VTN Nevada

Address: 2727 S. Rainbow Blvd, LV, NV, 89146

Type of Land Development/Land Disturbance Process:

|                          |                  |                                     |                          |                          |                              |
|--------------------------|------------------|-------------------------------------|--------------------------|--------------------------|------------------------------|
| <input type="checkbox"/> | Rezoning         | <input type="checkbox"/>            | Subdivision Map          | <input type="checkbox"/> | Clearing and Grading Only    |
| <input type="checkbox"/> | Parcel Map       | <input checked="" type="checkbox"/> | Planned Unit Development | <input type="checkbox"/> | Other (Please specify below) |
| <input type="checkbox"/> | Large Parcel Map | <input type="checkbox"/>            | Building Permit          |                          |                              |

1. Total Owned Land Area: At Site: +/- 10 Acres Being Developed/Disturbed: +/-10 Acres

2. Is a portion or all of the subject property located in a designated FEMA Flood Hazard Area? ☒ Yes\*\* ☐ No

3. Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? ☐ Yes\*\* ☒ No

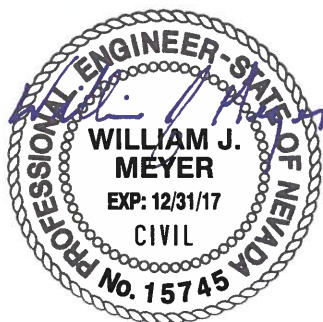
4. Proposed type of development (Residential, Commercial, Etc.): Residential (Apartments)

5. Approximate upstream land area which drains to the subject site: +/- 0.34 sq.mi

6. Has the site drainage been evaluated in the past? ☒ YES ☐ NO If yes, please identify documentation: Update to the TDS for Rancho Industrial Park (CLV DS# 2298); TDS for Crystal Park Apartments (CLV DS# 4734)

7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: Runoff will discharge east as surface flow to the existing Rancho Industrial Park site.

8. Briefly describe your proposed schedule for the subject project: As soon as possible



Engineer's Seal

03/12/18

Submit this form as part of the required drainage study to the local entity which has jurisdiction over the subject property. This form may provide sufficient information to serve as the Conceptual Drainage Study.

**\*New Required Field**

**\*\*Review and concurrence of the Clark County Regional Flood Control District is required.**

| Local Entity File No. | Revision | Date |
|-----------------------|----------|------|
|                       |          |      |
|                       |          |      |
|                       |          |      |

REFERENCE:

STANDARD FORM 1

**ADDENDUM #3 TO THE  
TECHNICAL DRAINAGE STUDY  
FOR  
CRYSTAL PARK  
CITY OF LAS VEGAS, NEVADA  
W.O. # 7844**

Prepared for:  
**ERNEST A. BECKER  
INVESTMENT COMPANY  
3065 North Rancho Drive Suite 130  
Las Vegas, NV 89130**

Submitted To:  
**CITY OF LAS VEGAS  
FLOOD CONTROL  
333 North Rancho Drive  
Las Vegas, NV 89106**



March 8, 2018  
W.O. #7844

Clark County Department of Public Works  
500 S Grand Central Parkway  
Box 55400  
Las Vegas, NV 89155-4000

Attention: Albert Sung, P.E., CFM  
Flood Control Project Engineer

**SUBJECT: ADDENDUM #3 TO THE TECHNICAL DRAINAGE STUDY FOR CRYSTAL PARK  
APARTMENTS**

Mr. Sung:

This *Addendum #3 to the Technical Drainage Study for Crystal Park Apartments* is being submitted to the Clark County Department of Public Works to address review comments dated February 22, 2018.

**Comment #1**

**Since the project is within a FEMA Flood Zone AE, Clark County Regional Flood Control District (CCRFCDD) concurrence is required prior to the final approval of the drainage study by the City of Las Vegas.**

Response #1: Copies of the technical drainage study and all pertinent addenda will be forwarded to CCRFCDD upon conditional approval of this study by the CLV.

**Comment #2**

**The last submittal of interpolated BFEs at various stations between the northern and southern ends of the project as the basis to revise the FEMA Flood Zone delineation is not acceptable. A proper hydraulic model such as HEC-RAS built on the FEMA FIS study must be utilized for the additional stations in both existing and proposed conditions. Review and revise accordingly.**

Response #2: HEC-RAS models for both the existing and developed condition were developed for this study. New cross sections were created using a finer resolution based on elevation interpolations developed in AutoCAD. The surface was developed from topographic information based on as-built documents by Alpha Engineering, and Dwyer Engineering, as well as flown topographic information. Copies of the relevant as-builts are included in Appendix D. The aerial topography was provided by Aerial Mapping Consultants dated 04-17-2017.

HEC-RAS models for both the existing and the developed condition have been developed for this study. The upstream boundary condition is based on referenced section 144+11.04 from the Lower Rancho model and was set at critical depth. This assumption is based on the referenced Froude of 1.06 as shown



on the included referenced Table 1 from the Rancho US95 Flood Hazard Mapping Restudy. The flow rate is 533 cfs, and is the FIS Proposed value, and is taken from the referenced model. A copy of Table 1 from the study is included in Appendix D of the study.

As can be seen on the Existing Condition Map the cross sections are developed to cross the adjacent parking lot and the proposed Crystal Park property. The cross sections shown for the developed condition have been cropped at the property line of the proposed apartment building. The intent is to show that the 533 cfs does not enter the proposed site at any location along the eastern boundary. These cross section locations are shown on the Existing and the Developed Flood Zone Exhibits included in Appendix A. Additionally, shown on the figures is the area of inundation. As can be seen in the Developed condition Cross Sections the flow does not enter the proposed site. The Existing and the Proposed HEC-RAS output have been included in Appendix C.

**Comment #3**

**The engineer/developer has submitted a cost estimate of \$228,614.84 in lieu of the construction of a required storm drain system in the frontage of the subject site in *Michael Way*. The contribution money will be collected prior to the final approval of the improvement plans.**

Response #3: The developer is aware of the contribution money, and understands that the money will be collected prior to approval of the improvement plans. Becker Investments will be in contact with the CLV concerning the cost sharing.

**Comment #4**

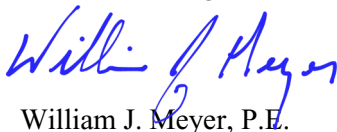
**This drainage study assumes that the project will be constructed in one phase. If improvement plans are submitted to break the project into separate phases, a drainage study update will be required for each phase addressing the interim condition.**

Response #4: The project will be constructed in one phase. If this changes and the site is developed in separate phases an update to the drainage study will be provided.

I hope this addresses your concerns regarding this project. If there are any questions or any additional information is required, please contact this office.

Respectfully Submitted,

VTN Consulting



William J. Meyer, P.E.

# **APPENDIX**

# **APPENDIX A**

## **FIGURES AND EXHIBITS**



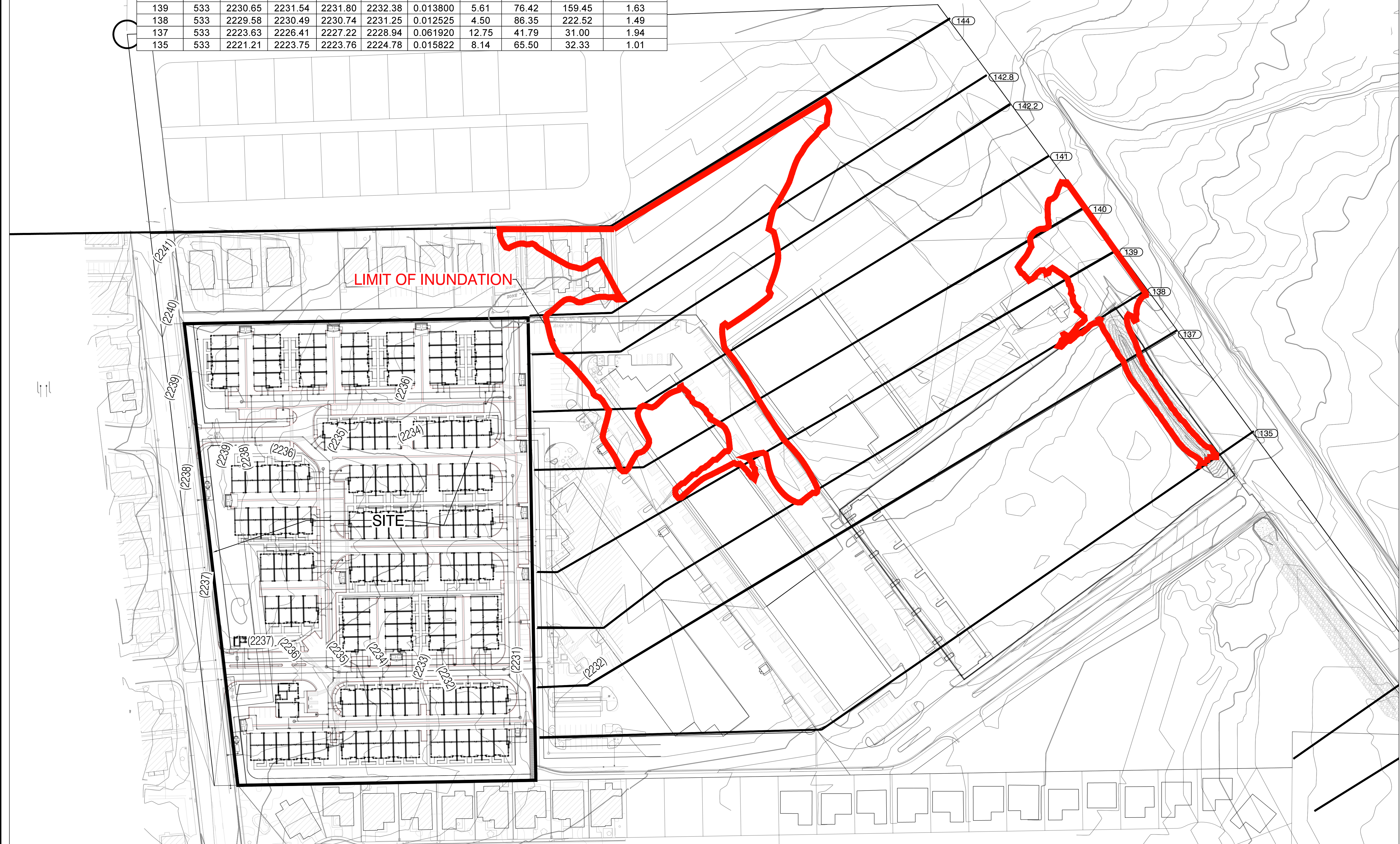
| River Sta | Q Total<br>(cfs) | Min Ch El<br>(ft) | W.S. Elev<br>(ft) | Crit W.S.<br>(ft) | E.G. Elev<br>(ft) | E.G. Slope<br>(ft/ft) | Vel Chnl<br>(ft/s) | Flow Area<br>(sq ft) | Top Width<br>(ft) | Froude # Chl |
|-----------|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|----------------------|-------------------|--------------|
| 144       | 533              | 2236.09           | 2236.71           | 2236.71           | 2236.88           | 0.004809              | 2.78               | 170.91               | 529.54            | 0.92         |
| 142.8     | 533              | 2234.35           | 2234.71           | 2234.87           | 2235.34           | 0.051092              | 5.92               | 84.32                | 413.91            | 2.70         |
| 142.2     | 533              | 2233.14           | 2234.20           | 2234.03           | 2234.31           | 0.001805              | 2.79               | 211.95               | 397.42            | 0.64         |
| 141       | 533              | 2232.16           | 2233.71           | 2233.70           | 2234.00           | 0.004286              | 4.41               | 129.31               | 234.61            | 0.99         |
| 140       | 533              | 2231.56           | 2232.82           | 2232.82           | 2233.14           | 0.004500              | 4.38               | 117.46               | 188.67            | 1.01         |
| 139       | 533              | 2230.68           | 2231.59           | 2231.82           | 2232.32           | 0.014240              | 6.73               | 77.79                | 159.58            | 1.72         |
| 138       | 533              | 2229.63           | 2230.53           | 2230.71           | 2231.14           | 0.013078              | 4.58               | 93.53                | 264.42            | 1.52         |
| 137       | 533              | 2223.65           | 2226.39           | 2227.14           | 2228.80           | 0.061550              | 12.45              | 42.79                | 32.80             | 1.92         |
| 135       | 533              | 2221.23           | 2223.83           | 2223.83           | 2224.86           | 0.015758              | 8.15               | 65.40                | 32.40             | 1.01         |

## SITE

H:\7844\Drainage\4\_ADD3\A Figures\Existing FLOOD ZONE EXHIBIT2 - HEC-RAS.dwg



| River Sta | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|-----------|---------|-----------|-----------|-----------|-----------|------------|----------|-----------|-----------|--------------|
|           | (cfs)   | (ft)      | (ft)      | (ft)      | (ft)      | (ft/ft)    | (ft/s)   | (sq ft)   | (ft)      |              |
| 144       | 533     | 2236.09   | 2236.71   | 2236.71   | 2236.88   | 0.004809   | 2.78     | 170.91    | 529.54    | 0.92         |
| 142.8     | 533     | 2234.36   | 2234.73   | 2234.89   | 2235.35   | 0.049056   | 5.90     | 84.85     | 411.96    | 2.65         |
| 142.2     | 533     | 2233.16   | 2234.18   | 2233.96   | 2234.27   | 0.001396   | 2.61     | 227.23    | 391.26    | 0.57         |
| 141       | 533     | 2232.08   | 2233.72   | 2233.72   | 2234.01   | 0.004506   | 4.44     | 129.00    | 233.11    | 1.01         |
| 140       | 533     | 2231.55   | 2232.80   | 2232.80   | 2233.12   | 0.004462   | 4.34     | 118.74    | 202.58    | 1.00         |
| 139       | 533     | 2230.65   | 2231.54   | 2231.80   | 2232.38   | 0.013800   | 5.61     | 76.42     | 159.45    | 1.63         |
| 138       | 533     | 2229.58   | 2230.49   | 2230.74   | 2231.25   | 0.012525   | 4.50     | 86.35     | 222.52    | 1.49         |
| 137       | 533     | 2228.63   | 2226.41   | 2227.22   | 2228.94   | 0.061920   | 12.75    | 41.79     | 31.00     | 1.94         |
| 135       | 533     | 2221.21   | 2223.75   | 2223.76   | 2224.78   | 0.015822   | 8.14     | 65.50     | 32.33     | 1.01         |





# **APPENDIX C**

## **HYDRAULIC CALCULATIONS**

**Existing HEC-RAS**



# EX FLOOD ZONE EXHIBIT2 - HEC-RAS.rep

HEC-RAS Version 4.1.0 Jan 2010  
U.S. Army Corps of Engineers  
Hydrologic Engineering Center  
609 Second Street  
Davis, California

```

X   X   XXXXXX   XXXX   XXXX   XX   XXXX
X   X   X       X   X   X   X   X   X
X   X   X       X   X   X   X   X   X
XXXXXX XXXX   X   XXX XXXX XXXXXX XXXX
X   X   X       X   X   X   X   X   X
X   X   X       X   X   X   X   X   X
X   X   XXXXXX   XXXX   X   X   X   X   XXXXX

```

## PROJECT DATA

Project Title: HEC-RAS model from Autodesk® River and Flood Analysis Module 2017  
Project File : EX FLOOD ZONE EXHIBIT2 - HEC-RAS.prj  
Run Date and Time: 3/8/2018 1:34:43 PM

Project in English units

## PLAN DATA

Plan Title: Current model

Plan File : H:\7844\Drainage\4\_ADD3\C Hydraulics\HEC- RAS\EX FLOOD ZONE EXHIBIT2 - HEC-RAS.P01

Geometry Title: Base Conditions Geometry

Geometry File : H:\7844\Drainage\4\_ADD3\C Hydraulics\HEC- RAS\EX FLOOD ZONE EXHIBIT2 - HEC-RAS.G01

Flow Title : 1 Flow Profiles

Flow File : H:\7844\Drainage\4\_ADD3\C Hydraulics\HEC- RAS\EX FLOOD ZONE EXHIBIT2 - HEC-RAS.F01

## Plan Summary Information:

|                             |   |                      |   |
|-----------------------------|---|----------------------|---|
| Number of: Cross Sections = | 9 | Multiple Openings =  | 0 |
| Culverts =                  | 0 | Inline Structures =  | 0 |
| Bridges =                   | 0 | Lateral Structures = | 0 |

## Computational Information

|                                        |       |
|----------------------------------------|-------|
| Water surface calculation tolerance =  | 0.01  |
| Critical depth calculation tolerance = | 0.01  |
| Maximum number of iterations =         | 20    |
| Maximum difference tolerance =         | 0.3   |
| Flow tolerance factor =                | 0.001 |

## Computation Options

|                                                           |
|-----------------------------------------------------------|
| Critical depth computed only where necessary              |
| Conveyance Calculation Method: At breaks in n values only |
| Friction Slope Method: Average Conveyance                 |
| Computational Flow Regime: Mixed Flow                     |

## FLOW DATA

Flow Title: 1 Flow Profiles

Flow File : H:\7844\Drainage\4\_ADD3\C Hydraulics\HEC- RAS\EX FLOOD ZONE EXHIBIT2 - HEC-RAS.F01

## Flow Data (cfs)

| River    | Reach    | RS  | Proposed |
|----------|----------|-----|----------|
| River #1 | Reach #1 | 144 | 533      |

## Boundary Conditions

| River    | Reach    | Profile  | Upstream | Downstream        |
|----------|----------|----------|----------|-------------------|
| River #1 | Reach #1 | Proposed | Critical | Known WS = 226.44 |

## GEOMETRY DATA

Geometry Title: Base Conditions Geometry

Geometry File : H:\7844\Drainage\4\_ADD3\C Hydraulics\HEC- RAS\EX FLOOD ZONE EXHIBIT2 - HEC-RAS.G01

## CROSS SECTION

RIVER: River #1

REACH: Reach #1 RS: 144

## INPUT

## Description:

| Station Elevation Data |         | num= 39 |         | Sta Elev |         | Sta Elev |         | Sta Elev |         | Sta Elev |      |
|------------------------|---------|---------|---------|----------|---------|----------|---------|----------|---------|----------|------|
| Sta                    | Elev    | Sta     | Elev    | Sta      | Elev    | Sta      | Elev    | Sta      | Elev    | Sta      | Elev |
| 0                      | 2238.02 | 13.31   | 2238    | 27.23    | 2238    | 32.27    | 2237.99 | 42.06    | 2237.99 |          |      |
| 53.35                  | 2238    | 62.89   | 2238    | 74.7     | 2238.02 | 93.73    | 2238.03 | 118.52   | 2238.06 |          |      |
| 127.83                 | 2238.07 | 147.87  | 2238.05 | 162.67   | 2238.04 | 162.89   | 2238.03 | 172.33   | 2238.03 |          |      |
| 183.25                 | 2238    | 234.92  | 2237.05 | 250.57   | 2236.82 | 273      | 2236.57 | 273.71   | 2236.57 |          |      |
| 285.31                 | 2236.38 | 299.22  | 2236.2  | 311.09   | 2236.09 | 419.61   | 2236.4  | 559.26   | 2236.59 |          |      |
| 676.09                 | 2236.49 | 686.57  | 2235.78 | 700.6    | 2235.98 | 707.69   | 2235.98 | 1292.77  | 2241.21 |          |      |
| 1328.14                | 2242.41 | 1405.17 | 2241.72 | 1408.44  | 2241.66 | 1414.78  | 2241.62 | 1419.5   | 2241.62 |          |      |
| 1426.69                | 2241.65 | 1435.43 | 2241.73 | 1442.49  | 2241.83 | 1466.6   | 2242.29 |          |         |          |      |

| Manning's n Values |       | num= 3 |       | Sta n Val |       | Sta n Val |       |
|--------------------|-------|--------|-------|-----------|-------|-----------|-------|
| Sta                | n Val | Sta    | n Val | Sta       | n Val | Sta       | n Val |
| 0                  | .016  | 118.52 | .016  | 676.09    | .016  |           |       |

| Bank Sta: Left | Right  | Lengths: Left | Channel | Right  | Coeff | Contr. | Expan. |
|----------------|--------|---------------|---------|--------|-------|--------|--------|
| 118.52         | 676.09 | 115.07        | 122.78  | 146.86 |       | .1     | .3     |

## CROSS SECTION

RIVER: River #1

REACH: Reach #1 RS: 142.8

## INPUT

## Description:

| Station Elevation Data |         | num= 40 |         | Sta Elev |         | Sta Elev |         | Sta Elev |         | Sta Elev |      |
|------------------------|---------|---------|---------|----------|---------|----------|---------|----------|---------|----------|------|
| Sta                    | Elev    | Sta     | Elev    | Sta      | Elev    | Sta      | Elev    | Sta      | Elev    | Sta      | Elev |
| 0                      | 2236.31 | 40.66   | 2236.2  | 89.53    | 2237.04 | 125.01   | 2237.04 | 125.01   | 2237.17 |          |      |
| 146.14                 | 2237.24 | 181.48  | 2236.93 | 234.36   | 2236    | 291.09   | 2234.88 | 348.76   | 2235.38 |          |      |
| 372.18                 | 2235.26 | 490.48  | 2234.35 | 544.35   | 2234.49 | 727.41   | 2234.7  | 727.56   | 2234.55 |          |      |
| 762.16                 | 2234.77 | 772.3   | 2234.07 | 783.34   | 2234.1  | 855.92   | 2234.56 | 912      | 2235.2  |          |      |
| 944.41                 | 2235.87 | 977.37  | 2235.75 | 1007.08  | 2236.26 | 1054.24  | 2236.74 | 1097.49  | 2237.13 |          |      |
| 1132.5                 | 2236.93 | 1200.47 | 2237.59 | 1214.48  | 2237.66 | 1228.74  | 2238.15 | 1256.36  | 2237.91 |          |      |
| 1286.81                | 2238.26 | 1298.02 | 2238.98 | 1308.41  | 2239.04 | 1346.73  | 2240.14 | 1372.8   | 2239.93 |          |      |
| 1412.8                 | 2239.99 | 1442.28 | 2240.52 | 1492.74  | 2239.96 | 1501.06  | 2239.56 | 1530.61  | 2240.18 |          |      |

| Manning's n Values |       | num= 3 |       | Sta n Val |       | Sta n Val |       |
|--------------------|-------|--------|-------|-----------|-------|-----------|-------|
| Sta                | n Val | Sta    | n Val | Sta       | n Val | Sta       | n Val |
| 0                  | .016  | 125.01 | .016  | 762.16    | .025  |           |       |

| Bank Sta: Left | Right  | Lengths: Left | Channel | Right | Coeff | Contr. | Expan. |
|----------------|--------|---------------|---------|-------|-------|--------|--------|
| 125.01         | 762.16 | 69.34         | 65.07   | 66.94 |       | .1     | .3     |

## CROSS SECTION

RIVER: River #1

REACH: Reach #1 RS: 142.2

## INPUT

## Description:

| Station Elevation Data |         | num= 39 |         | Sta Elev |         | Sta Elev |         | Sta Elev |         | Sta Elev |      |
|------------------------|---------|---------|---------|----------|---------|----------|---------|----------|---------|----------|------|
| Sta                    | Elev    | Sta     | Elev    | Sta      | Elev    | Sta      | Elev    | Sta      | Elev    | Sta      | Elev |
| 0                      | 2235.86 | 27.37   | 2235.99 | 69.69    | 2235.77 | 86.3     | 2235.98 | 148.68   | 2236.04 |          |      |
| 168.84                 | 2236.03 | 215.29  | 2236    | 259.21   | 2234.99 | 298.41   | 2234.26 | 414.47   | 2234.84 |          |      |
| 600.86                 | 2233.4  | 619.42  | 2233.45 | 682.53   | 2233.52 | 682.92   | 2233.14 | 704.91   | 2233.38 |          |      |
| 785.65                 | 2233.78 | 788.73  | 2233.6  | 799.81   | 2233.5  | 826.88   | 2233.74 | 882.98   | 2234.11 |          |      |
| 948.84                 | 2234.6  | 971.77  | 2234.69 | 991.78   | 2235.11 | 1011.05  | 2235.27 | 1071.82  | 2235.21 |          |      |
| 1101.84                | 2235.4  | 1141.86 | 2235.41 | 1181.88  | 2236.08 | 1231.91  | 2236.14 | 1261.93  | 2237.26 |          |      |
| 1291.94                | 2237.34 | 1331.97 | 2237.85 | 1361.98  | 2238.35 | 1409.61  | 2238.55 | 1467.72  | 2238.75 |          |      |
| 1492.05                | 2239.22 | 1522.07 | 2239.13 | 1537.24  | 2238.84 | 1565.81  | 2239.43 |          |         |          |      |

| Manning's n Values |       | num= 3 |       | Sta n Val |       | Sta n Val |       |
|--------------------|-------|--------|-------|-----------|-------|-----------|-------|
| Sta                | n Val | Sta    | n Val | Sta       | n Val | Sta       | n Val |
| 0                  | .016  | 148.68 | .016  | 788.73    | .025  |           |       |

| Bank Sta: Left | Right  | Lengths: Left | Channel | Right  | Coeff | Contr. | Expan. |
|----------------|--------|---------------|---------|--------|-------|--------|--------|
| 148.68         | 788.73 | 105.8         | 111.66  | 101.34 |       | .1     | .3     |

## CROSS SECTION

RIVER: River #1

REACH: Reach #1 RS: 141

## INPUT

## Description:

| Station Elevation Data |         | num= 40 |         | Sta Elev |         | Sta Elev |         | Sta Elev |         | Sta Elev |      |
|------------------------|---------|---------|---------|----------|---------|----------|---------|----------|---------|----------|------|
| Sta                    | Elev    | Sta     | Elev    | Sta      | Elev    | Sta      | Elev    | Sta      | Elev    | Sta      | Elev |
| 0                      | 2234.07 | 47.28   | 2233.94 | 95.79    | 2234    | 145.57   | 2235.24 | 166.39   | 2235.3  |          |      |
| 227.86                 | 2234.85 | 279.58  | 2234    | 312.49   | 2234.05 | 415.15   | 2234.22 | 472.91   | 2234.3  |          |      |
| 630.56                 | 2234.3  | 650.69  | 2233.28 | 659.37   | 2232.16 | 717.25   | 2232.73 | 739.14   | 2232.93 |          |      |
| 747.17                 | 2233.6  | 801.3   | 2233.6  | 828.58   | 2233.6  | 849.78   | 2233.18 | 889.59   | 2233.96 |          |      |
| 923.32                 | 2234.22 | 998.64  | 2234.42 | 1017.75  | 2234.06 | 1049.08  | 2234.39 | 1080.85  | 2234.22 |          |      |

## EX FLOOD ZONE EXHIBIT2 - HEC-RAS.rep

1105.91 2234.38 1186.23 2234.43 1231.6 2235.19 1271.38 2235.06 1301.35 2235.19  
 1318.36 2236.13 1371.94 2236.28 1407.3 2236.77 1460.32 2237.06 1485.45 2237.61  
 1506.38 2238.45 1546.39 2239.04 1587.88 2238.34 1589.89 2238.01 1622.21 2238.68

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 0 .016 166.39 .016 828.58 .025

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 166.39 828.58 142.3 213.36 101.5 .1 .3

CROSS SECTION

RIVER: River #1  
 REACH: Reach #1 RS: 140

## INPUT

Description:

Station Elevation Data num= 40  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 0 2232.11 55.86 2232 77.72 2232.84 97.78 2232.64 122.57 2233.04  
 169.92 2233.3 203.04 2233.95 275.06 2234.01 463.68 2234.3 522.37 2234.3  
 590.98 2234.3 633.18 2234.3 641.56 2233.83 660.02 2231.56 701.36 2231.97  
 734.93 2232.92 740.39 2233.43 762.52 2233.6 831.43 2233.6 882.77 2233.27  
 922.04 2232.83 988.38 2234.14 1011.52 2234.22 1030.49 2234.75 1073.09 2233.7  
 1128.88 2234.66 1208.9 2234.77 1258.54 2234.86 1298.92 2236.24 1340 2235.97  
 1398.95 2236.8 1428.95 2236.52 1455.72 2237.44 1478.97 2238.29 1528.98 2237.81  
 1548.98 2237.84 1598.99 2239.06 1639.57 2237.93 1641.57 2237.6 1670.98 2238.2

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 0 .016 77.72 .016 882.77 .025

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 77.72 882.77 109.75 105.9 232.03 .1 .3

CROSS SECTION

RIVER: River #1  
 REACH: Reach #1 RS: 139

## INPUT

Description:

Station Elevation Data num= 40  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 0 2231.06 31.46 2231.03 31.46 2231.01 62.8 2230.68 128.62 2232  
 197.3 2232.01 232.69 2233.07 260.06 2232.61 299.42 2232.63 366.21 2234.15  
 466.3 2234.3 562.4 2234.3 636.72 2234.19 662.91 2231.01 689.18 2231.28  
 725.7 2232.32 727.06 2231.16 743.35 2231.93 765.04 2232.1 852.52 2232.1  
 860.57 2231.93 927.48 2232.82 974.42 2232.33 1001.17 2232.4 1086.81 2233.45  
 1111.88 2233.45 1171.22 2232.43 1231.22 2232.3 1291.23 2233.11 1341.23 2234.01  
 1383.15 2234.78 1431.24 2235.24 1461.24 2235.76 1527.37 2236.1 1551.25 2236.37  
 1611.26 2237.76 1651.26 2238.52 1703.76 2237.28 1704.78 2236.84 1737.52 2237.6

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 0 .016 31.46 .016 1111.88 .025

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 31.46 1111.88 84.94 84.28 123.04 .1 .3

CROSS SECTION

RIVER: River #1  
 REACH: Reach #1 RS: 138

## INPUT

Description:

Station Elevation Data num= 39  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 0 2230.04 29.56 2230 57.08 2229.63 103.77 2230.3 132.66 2230.17  
 223.68 2230.55 312.05 2230.99 374.24 2231.38 457.79 2234.21 546.14 2234.3  
 561.25 2233 614.29 2231.67 651.31 2231.47 660.12 2230.34 695.47 2230.31  
 739.78 2231.43 747.8 2232.1 849.1 2232.1 857.12 2231.93 949.53 2233.39  
 987.85 2233.79 1054.34 2231.81 1095.65 2231.89 1124.46 2232.47 1146.77 2232.37  
 1188.97 2233.06 1237.22 2231.61 1299.79 2231.94 1331.17 2232.6 1367.22 2232.83  
 1417.22 2233.55 1447.22 2233.61 1506.76 2234.54 1557.23 2235.23 1603.8 2236.26  
 1677.23 2237.28 1707.23 2237.51 1758.51 2236.88 1793.47 2237.22

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 0 .016 57.08 .016 1095.65 .025

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 57.08 1095.65 88.11 87.9 73.66 .1 .3



## CROSS SECTION

RIVER: River #1  
 REACH: Reach #1 RS: 137

## INPUT

## Description:

| Station | Elevation | Data    | num=    | 37      | Sta     | Elev    | Sta     | Elev    | Sta     | Elev | Sta | Elev |
|---------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|------|-----|------|
| 0       | 2228.67   | 66.78   | 2228.26 | 66.78   | 2228.13 | 72.02   | 2227.03 | 87.67   | 2223.65 |      |     |      |
| 94.74   | 2224.83   | 112.93  | 2227.01 | 112.93  | 2227.5  | 152.93  | 2227.71 | 200.28  | 2228.4  |      |     |      |
| 264.58  | 2229.45   | 320.89  | 2229.74 | 377.44  | 2230.12 | 397.02  | 2230.17 | 457.79  | 2230.89 |      |     |      |
| 496.08  | 2230.99   | 553.51  | 2230.95 | 596.52  | 2230.31 | 634.17  | 2230.13 | 672.92  | 2229.82 |      |     |      |
| 736     | 2231.43   | 744.04  | 2232.1  | 829.72  | 2232.1  | 853.5   | 2231.93 | 904.76  | 2232.74 |      |     |      |
| 917.12  | 2231.19   | 983.68  | 2232    | 1007.67 | 2232    | 1064.26 | 2231.8  | 1104.37 | 2231.47 |      |     |      |
| 1164.86 | 2231.88   | 1235.73 | 2232.32 | 1300.8  | 2230.8  | 1330.26 | 2231.1  | 1374.69 | 2231.93 |      |     |      |
| 1436.96 | 2232.32   | 1449.69 | 2232.82 |         |         |         |         |         |         |      |     |      |

| Manning's n | Values | num=  | 3    | Sta    | n Val | Sta | n Val |
|-------------|--------|-------|------|--------|-------|-----|-------|
| 0           | .016   | 66.78 | .035 | 112.93 | .022  |     |       |

| Bank Sta: | Left  | Right  | Lengths: | Left Channel | Right  | Coeff  | Contr. | Expan. |
|-----------|-------|--------|----------|--------------|--------|--------|--------|--------|
|           | 66.78 | 112.93 |          | 219.3        | 219.28 | 221.57 | .1     | .3     |

## CROSS SECTION

RIVER: River #1  
 REACH: Reach #1 RS: 135

## INPUT

## Description:

| Station | Elevation | Data    | num=    | 40      | Sta     | Elev    | Sta     | Elev    | Sta     | Elev | Sta | Elev |
|---------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|------|-----|------|
| 0       | 2226.01   | 73.55   | 2226    | 74.19   | 2225.17 | 77.61   | 2222.29 | 85.29   | 2221.24 |      |     |      |
| 88.08   | 2221.23   | 91.41   | 2221.23 | 94.08   | 2221.23 | 102.18  | 2222.36 | 108.18  | 2222.36 |      |     |      |
| 108.18  | 2224.92   | 202.72  | 2225.76 | 255.33  | 2227.11 | 323.91  | 2227.92 | 412.48  | 2228.69 |      |     |      |
| 463.73  | 2228.58   | 529.91  | 2228.38 | 597.79  | 2228.16 | 640.27  | 2227.76 | 679.7   | 2228.57 |      |     |      |
| 757.4   | 2230.18   | 847.84  | 2230.28 | 898.08  | 2229.73 | 940.11  | 2230.21 | 1007.26 | 2231.24 |      |     |      |
| 1056.29 | 2232      | 1141.63 | 2232    | 1188.54 | 2231.26 | 1239.82 | 2230.23 | 1263.68 | 2231.06 |      |     |      |
| 1348.4  | 2231.12   | 1404.68 | 2230.76 | 1491.42 | 2232.14 | 1584.75 | 2233.29 | 1660.7  | 2234.31 |      |     |      |
| 1744.24 | 2235.47   | 1814.85 | 2236.21 | 1882.17 | 2236.38 | 1914.28 | 2235.64 | 1947.69 | 2236.31 |      |     |      |

| Manning's n | Values | num=  | 3    | Sta    | n Val | Sta | n Val |
|-------------|--------|-------|------|--------|-------|-----|-------|
| 0           | .016   | 73.55 | .035 | 108.18 | .022  |     |       |

| Bank Sta: | Left  | Right  | Coeff | Contr. | Expan. |
|-----------|-------|--------|-------|--------|--------|
|           | 73.55 | 108.18 | .1    | .3     |        |

## SUMMARY OF MANNING'S N VALUES

River: River #1

| Reach    | River Sta. | n1   | n2   | n3   |
|----------|------------|------|------|------|
| Reach #1 | 144        | .016 | .016 | .016 |
| Reach #1 | 142.8      | .016 | .016 | .025 |
| Reach #1 | 142.2      | .016 | .016 | .025 |
| Reach #1 | 141        | .016 | .016 | .025 |
| Reach #1 | 140        | .016 | .016 | .025 |
| Reach #1 | 139        | .016 | .016 | .025 |
| Reach #1 | 138        | .016 | .016 | .025 |
| Reach #1 | 137        | .016 | .035 | .022 |
| Reach #1 | 135        | .016 | .035 | .022 |

## SUMMARY OF REACH LENGTHS

River: River #1

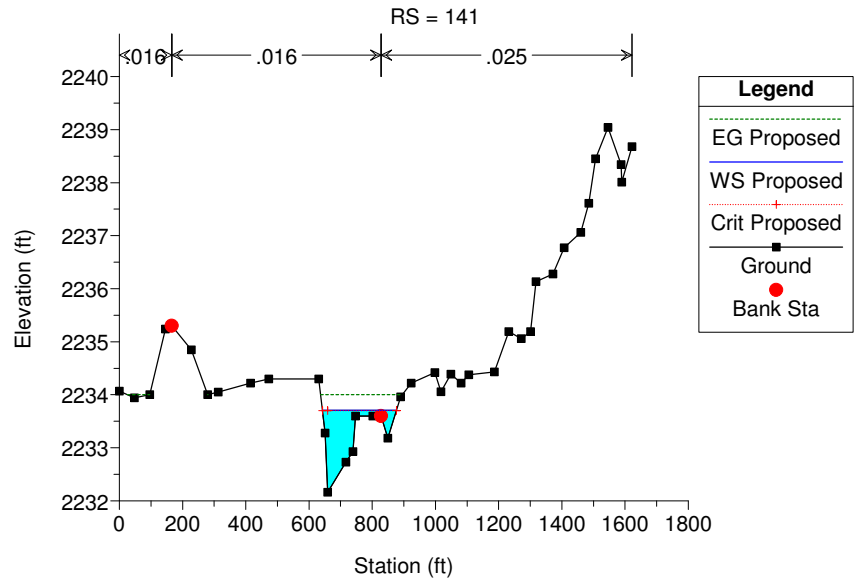
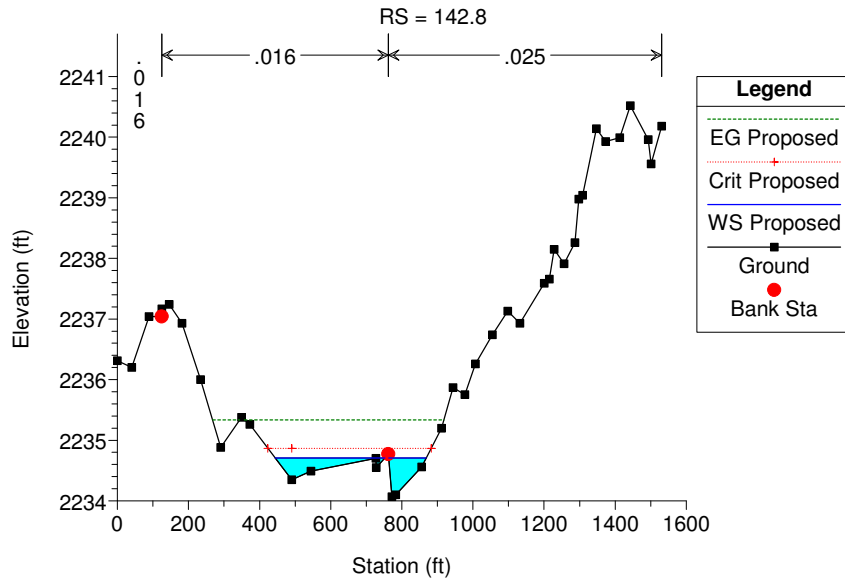
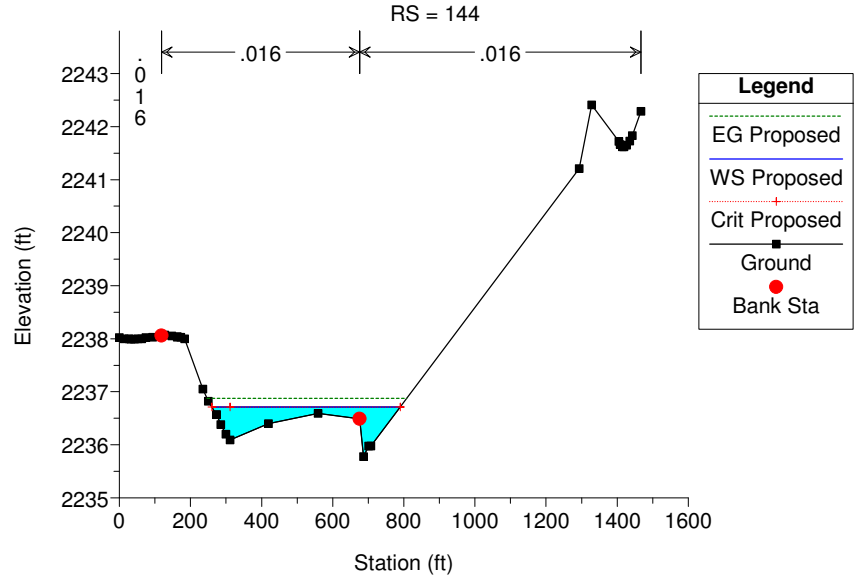
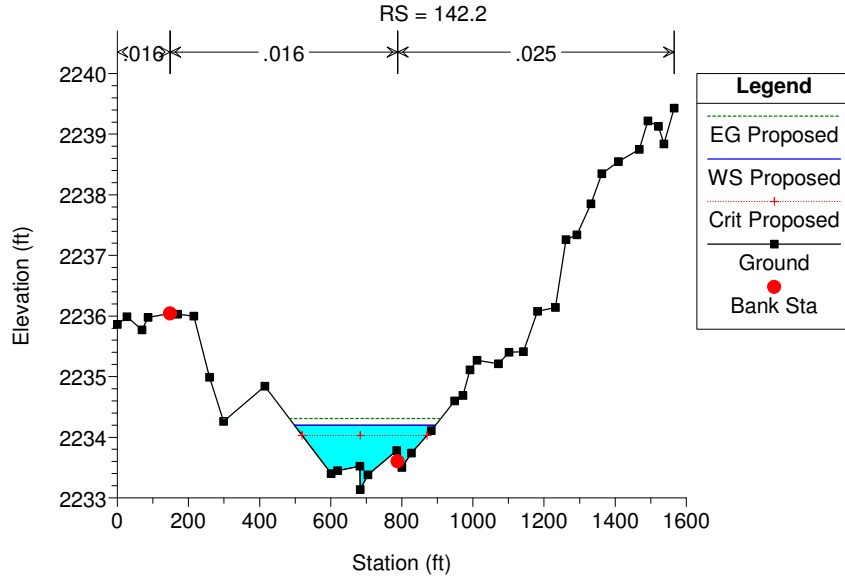
| Reach    | River Sta. | Left   | Channel | Right  |
|----------|------------|--------|---------|--------|
| Reach #1 | 144        | 115.07 | 122.78  | 146.86 |
| Reach #1 | 142.8      | 69.34  | 65.07   | 66.94  |
| Reach #1 | 142.2      | 105.8  | 111.66  | 101.34 |
| Reach #1 | 141        | 142.3  | 213.36  | 101.5  |
| Reach #1 | 140        | 109.75 | 105.9   | 232.03 |
| Reach #1 | 139        | 84.94  | 84.28   | 123.04 |
| Reach #1 | 138        | 88.11  | 87.9    | 73.66  |
| Reach #1 | 137        | 219.3  | 219.28  | 221.57 |
| Reach #1 | 135        |        |         |        |

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS  
River: River #1

| Reach    | River Sta. | Contr. | Expan. |
|----------|------------|--------|--------|
| Reach #1 | 144        | .1     | .3     |
| Reach #1 | 142.8      | .1     | .3     |
| Reach #1 | 142.2      | .1     | .3     |
| Reach #1 | 141        | .1     | .3     |
| Reach #1 | 140        | .1     | .3     |
| Reach #1 | 139        | .1     | .3     |
| Reach #1 | 138        | .1     | .3     |
| Reach #1 | 137        | .1     | .3     |
| Reach #1 | 135        | .1     | .3     |

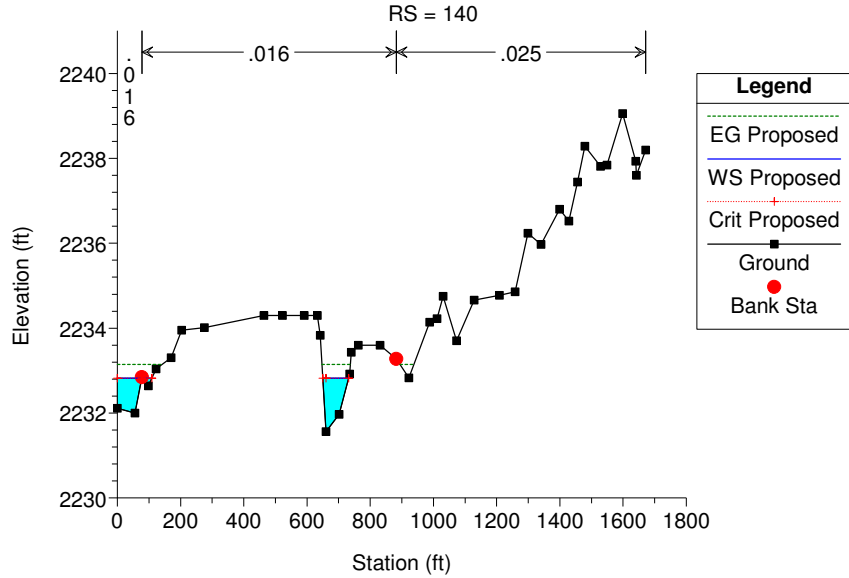
HEC-RAS Plan: Current mode River: River #1 Reach: Reach #1 Profile: Proposed

| Reach    | River Sta | Profile  | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|----------|-----------|----------|---------|-----------|-----------|-----------|-----------|------------|----------|-----------|-----------|--------------|
|          |           |          | (cfs)   | (ft)      | (ft)      | (ft)      | (ft)      | (ft/ft)    | (ft/s)   | (sq ft)   | (ft)      |              |
| Reach #1 | 144       | Proposed | 533.00  | 2236.09   | 2236.71   | 2236.71   | 2236.88   | 0.004809   | 2.78     | 170.91    | 529.54    | 0.92         |
| Reach #1 | 142.8     | Proposed | 533.00  | 2234.35   | 2234.71   | 2234.87   | 2235.34   | 0.051092   | 5.92     | 84.32     | 413.91    | 2.70         |
| Reach #1 | 142.2     | Proposed | 533.00  | 2233.14   | 2234.20   | 2234.03   | 2234.31   | 0.001805   | 2.79     | 211.95    | 397.42    | 0.64         |
| Reach #1 | 141       | Proposed | 533.00  | 2232.16   | 2233.71   | 2233.70   | 2234.00   | 0.004286   | 4.41     | 129.31    | 234.61    | 0.99         |
| Reach #1 | 140       | Proposed | 533.00  | 2231.56   | 2232.82   | 2232.82   | 2233.14   | 0.004500   | 4.38     | 117.46    | 188.67    | 1.01         |
| Reach #1 | 139       | Proposed | 533.00  | 2230.68   | 2231.59   | 2231.82   | 2232.32   | 0.014240   | 6.73     | 77.79     | 159.58    | 1.72         |
| Reach #1 | 138       | Proposed | 533.00  | 2229.63   | 2230.53   | 2230.71   | 2231.14   | 0.013078   | 4.58     | 93.53     | 264.42    | 1.52         |
| Reach #1 | 137       | Proposed | 533.00  | 2223.65   | 2226.39   | 2227.14   | 2228.80   | 0.061550   | 12.45    | 42.79     | 32.80     | 1.92         |
| Reach #1 | 135       | Proposed | 533.00  | 2221.23   | 2223.83   | 2223.83   | 2224.86   | 0.015758   | 8.15     | 65.40     | 32.40     | 1.01         |

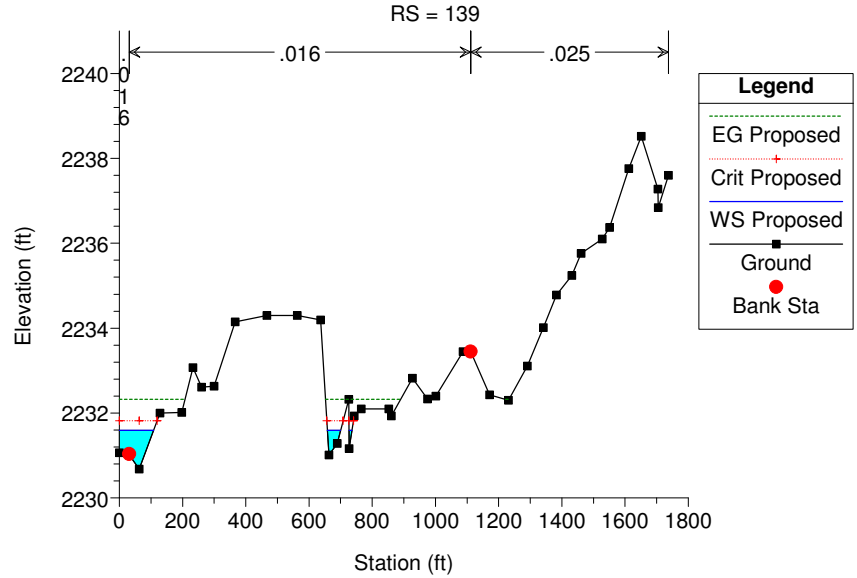




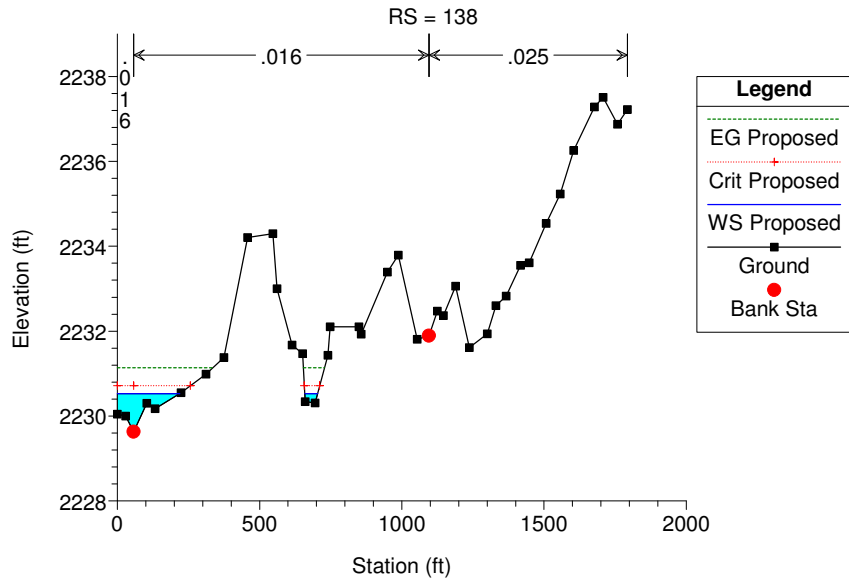
HEC-RAS model from Autodesk® River and Flood Analysis Module 2017 Plan: Current model 3/8/2018



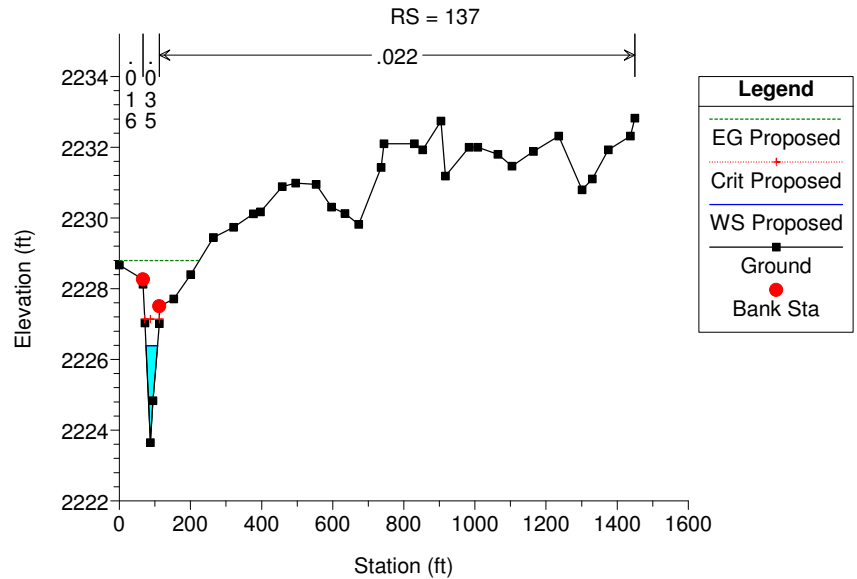
HEC-RAS model from Autodesk® River and Flood Analysis Module 2017 Plan: Current model 3/8/2018

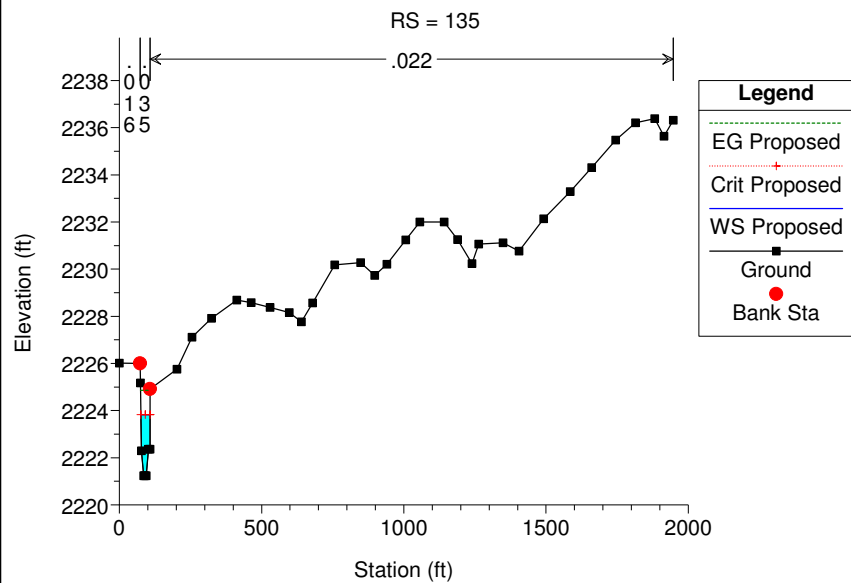


HEC-RAS model from Autodesk® River and Flood Analysis Module 2017 Plan: Current model 3/8/2018

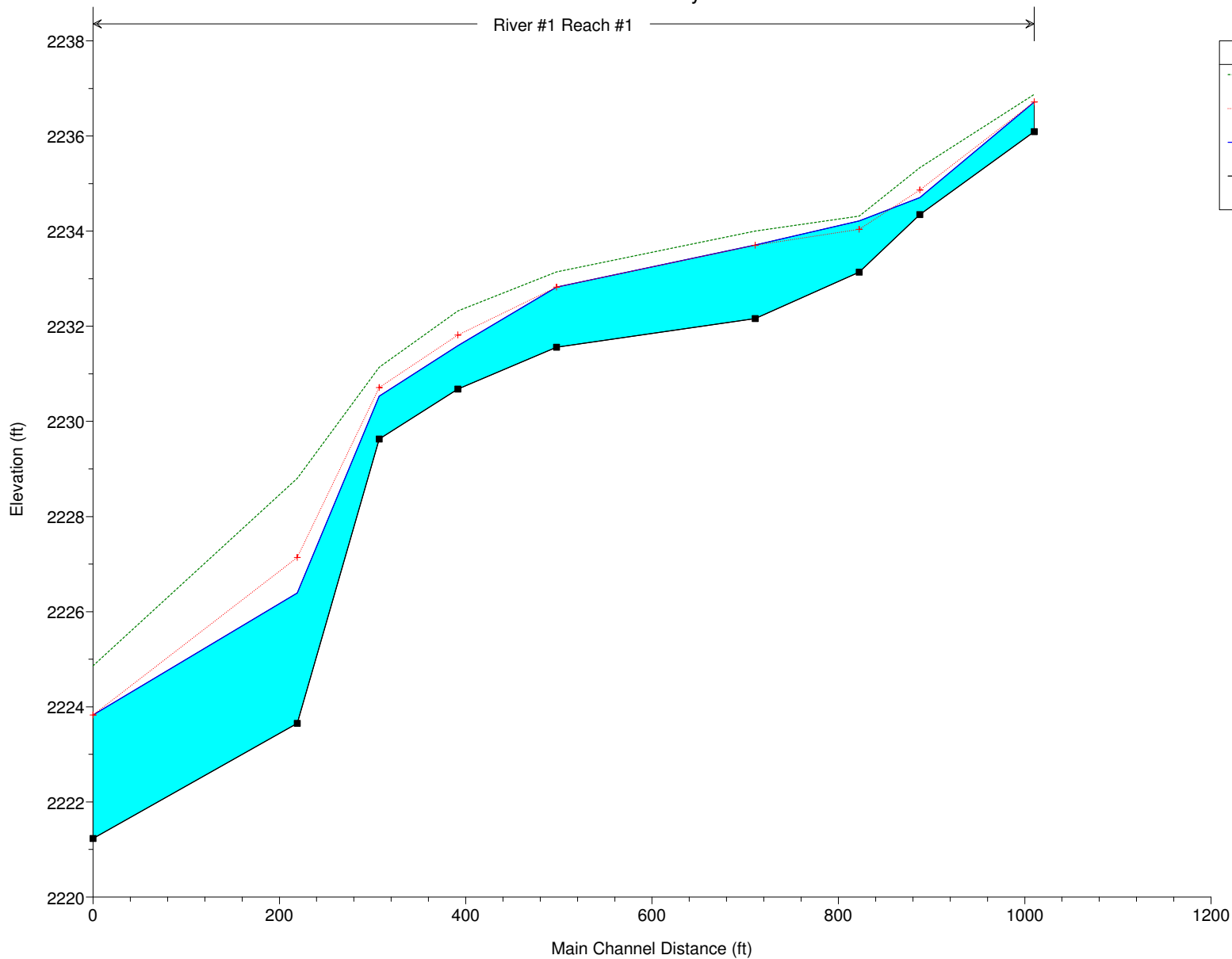


HEC-RAS model from Autodesk® River and Flood Analysis Module 2017 Plan: Current model 3/8/2018





River #1 Reach #1



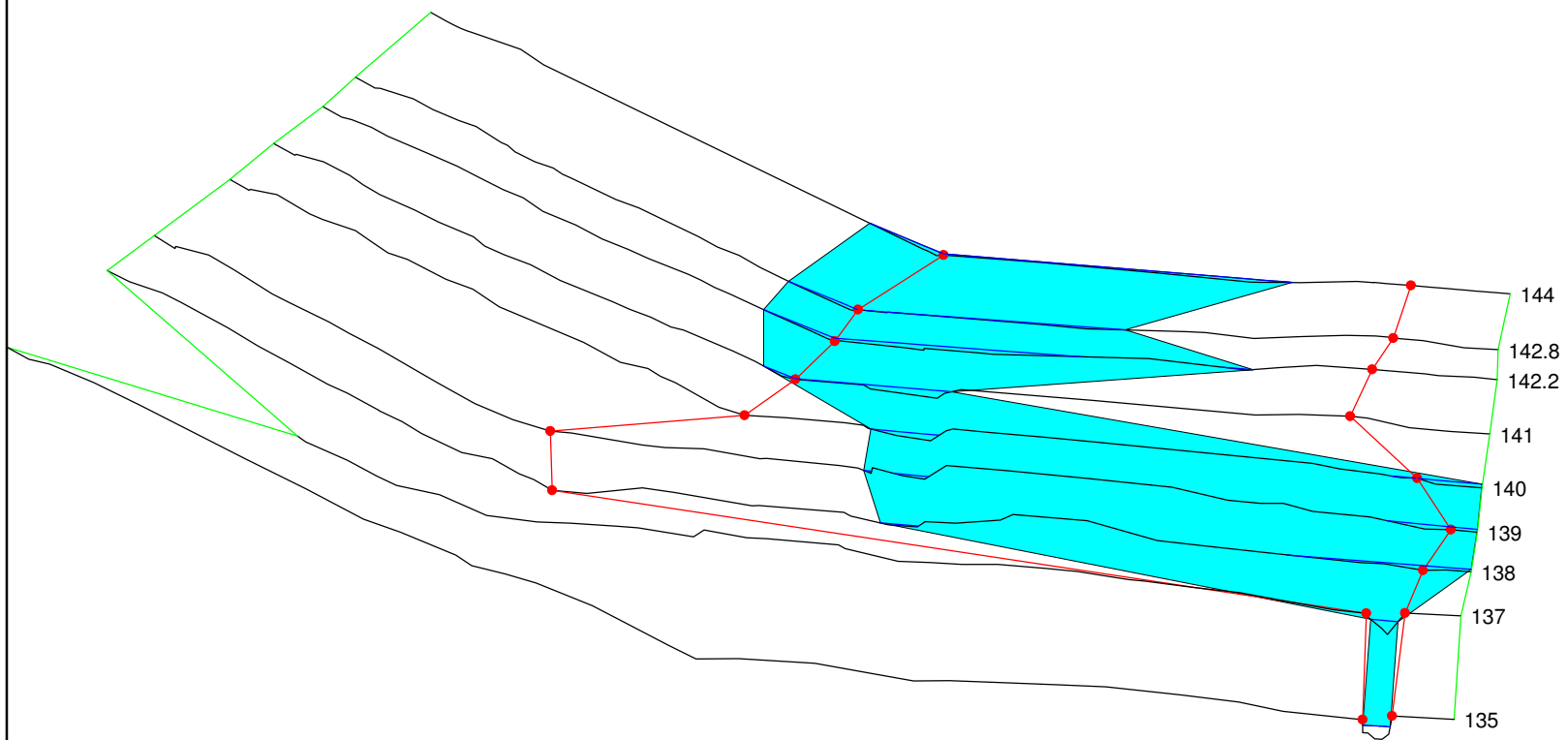
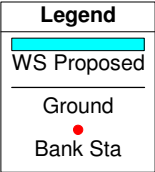
**Legend**

EG Proposed

Crit Proposed

WS Proposed

Ground



**Developed HEC-RAS**



# DEV FLOOD ZONE EXHIBIT2 - HEC-RAS.rep

HEC-RAS Version 4.1.0 Jan 2010  
U.S. Army Corps of Engineers  
Hydrologic Engineering Center  
609 Second Street  
Davis, California

```

X   X   XXXXXX   XXXX   XXXX   XX   XXXX
X   X   X       X   X   X   X   X   X
X   X   X       X   X   X   X   X   X
XXXXXXXX XXXX   X       XXX XXXX XXXXXX XXXX
X   X   X       X       X   X   X   X   X
X   X   X       X   X   X   X   X   X
X   X   XXXXXX   XXXX   X   X   X   X   XXXX

```

## PROJECT DATA

Project Title: HEC-RAS model from Autodesk® River and Flood Analysis Module 2017  
Project File : DEV FLOOD ZONE EXHIBIT2 - HEC-RAS.prj  
Run Date and Time: 3/8/2018 1:26:55 PM

Project in English units

## PLAN DATA

Plan Title: Current model

Plan File : H:\7844\Drainage\4\_ADD3\C Hydraulics\HEC- RAS\DEV FLOOD ZONE EXHIBIT2 - HEC-RAS.P01

Geometry Title: Base Conditions Geometry

Geometry File : H:\7844\Drainage\4\_ADD3\C Hydraulics\HEC- RAS\DEV FLOOD ZONE EXHIBIT2 - HEC-RAS.G01

Flow Title : 1 Flow Profiles

Flow File : H:\7844\Drainage\4\_ADD3\C Hydraulics\HEC- RAS\DEV FLOOD ZONE EXHIBIT2 - HEC-RAS.F01

## Plan Summary Information:

|                             |   |                      |   |
|-----------------------------|---|----------------------|---|
| Number of: Cross Sections = | 9 | Multiple Openings =  | 0 |
| Culverts =                  | 0 | Inline Structures =  | 0 |
| Bridges =                   | 0 | Lateral Structures = | 0 |

## Computational Information

|                                        |       |
|----------------------------------------|-------|
| Water surface calculation tolerance =  | 0.01  |
| Critical depth calculation tolerance = | 0.01  |
| Maximum number of iterations =         | 20    |
| Maximum difference tolerance =         | 0.3   |
| Flow tolerance factor =                | 0.001 |

## Computation Options

|                                                           |
|-----------------------------------------------------------|
| Critical depth computed only where necessary              |
| Conveyance Calculation Method: At breaks in n values only |
| Friction Slope Method: Average Conveyance                 |
| Computational Flow Regime: Mixed Flow                     |

## FLOW DATA

Flow Title: 1 Flow Profiles

Flow File : H:\7844\Drainage\4\_ADD3\C Hydraulics\HEC- RAS\DEV FLOOD ZONE EXHIBIT2 - HEC-RAS.F01

## Flow Data (cfs)

|          |          |     |          |
|----------|----------|-----|----------|
| River    | Reach    | RS  | Proposed |
| River #1 | Reach #1 | 144 | 533      |

## Boundary Conditions

|          |          |          |          |                   |
|----------|----------|----------|----------|-------------------|
| River    | Reach    | Profile  | Upstream | Downstream        |
| River #1 | Reach #1 | Proposed | Critical | Known WS = 226.44 |

## GEOMETRY DATA

Geometry Title: Base Conditions Geometry

Geometry File : H:\7844\Drainage\4\_ADD3\C Hydraulics\HEC- RAS\DEV FLOOD ZONE EXHIBIT2 - HEC-RAS.G01

## CROSS SECTION

RIVER: River #1

REACH: Reach #1 RS: 144

## INPUT

## Description:

| Station | Elevation | Data    | num=    | 39      | Sta     | Elev    | Sta     | Elev    | Sta     | Elev |
|---------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|------|
| 0       | 2238.02   | 13.31   | 2238    | 27.23   | 2238    | 32.27   | 2237.99 | 42.06   | 2237.99 |      |
| 53.35   | 2238      | 62.89   | 2238    | 74.7    | 2238.02 | 93.73   | 2238.03 | 118.52  | 2238.06 |      |
| 127.83  | 2238.07   | 147.87  | 2238.05 | 162.67  | 2238.04 | 162.89  | 2238.03 | 172.33  | 2238.03 |      |
| 183.25  | 2238      | 234.92  | 2237.05 | 250.57  | 2236.82 | 273     | 2236.57 | 273.71  | 2236.57 |      |
| 285.31  | 2236.38   | 299.22  | 2236.2  | 311.09  | 2236.09 | 419.61  | 2236.4  | 559.26  | 2236.59 |      |
| 676.09  | 2236.49   | 686.57  | 2235.78 | 700.6   | 2235.98 | 707.69  | 2235.98 | 1292.77 | 2241.21 |      |
| 1328.14 | 2242.41   | 1405.17 | 2241.72 | 1408.44 | 2241.66 | 1414.78 | 2241.62 | 1419.5  | 2241.62 |      |
| 1426.69 | 2241.65   | 1435.43 | 2241.73 | 1442.49 | 2241.83 | 1466.6  | 2242.29 |         |         |      |

| Manning's n Values |       | num=   | 3     |
|--------------------|-------|--------|-------|
| Sta                | n Val | Sta    | n Val |
| 0                  | .016  | 118.52 | .016  |
| 676.09             |       |        | .016  |

| Bank Sta: | Left | Right  | Lengths: | Left Channel | Right  | Coeff | Contr. | Expan. |
|-----------|------|--------|----------|--------------|--------|-------|--------|--------|
| 118.52    |      | 676.09 | 115.07   | 122.78       | 146.86 |       | .1     | .3     |

## CROSS SECTION

RIVER: River #1

REACH: Reach #1 RS: 142.8

## INPUT

## Description:

| Station | Elevation | Data   | num=    | 39     | Sta     | Elev   | Sta     | Elev   | Sta     | Elev |
|---------|-----------|--------|---------|--------|---------|--------|---------|--------|---------|------|
| 0       | 2236.29   | 34.91  | 2236.26 | 39.83  | 2236.18 | 48.89  | 2236.33 | 53.31  | 2236.43 |      |
| 67.19   | 2236.7    | 78.51  | 2236.89 | 82.4   | 2236.91 | 84.75  | 2236.97 | 88.31  | 2237.02 |      |
| 93.69   | 2236.93   | 97.01  | 2237.03 | 124.09 | 2237.03 | 124.09 | 2237.16 | 145.42 | 2237.23 |      |
| 156.49  | 2237.11   | 180.6  | 2236.93 | 192.27 | 2236.74 | 233.18 | 2236    | 237.8  | 2235.88 |      |
| 249.12  | 2235.64   | 257.96 | 2235.47 | 275.82 | 2235.18 | 278.65 | 2235.11 | 289.97 | 2234.88 |      |
| 347.57  | 2235.38   | 370.97 | 2235.26 | 488.63 | 2234.36 | 542.61 | 2234.5  | 727.18 | 2234.72 |      |
| 727.33  | 2234.58   | 758.93 | 2234.76 | 766.13 | 2234.87 | 771.11 | 2234.08 | 773.86 | 2234.06 |      |
| 781.28  | 2234.11   | 851.38 | 2234.55 | 898.42 | 2235.08 | 898.62 | 2235.08 |        |         |      |

| Manning's n Values |       | num=   | 3     |
|--------------------|-------|--------|-------|
| Sta                | n Val | Sta    | n Val |
| 0                  | .016  | 124.09 | .016  |
| 758.93             |       |        | .025  |

| Bank Sta: | Left | Right  | Lengths: | Left Channel | Right | Coeff | Contr. | Expan. |
|-----------|------|--------|----------|--------------|-------|-------|--------|--------|
| 124.09    |      | 758.93 | 104.02   | 70.35        | 67.48 |       | .1     | .3     |

## CROSS SECTION

RIVER: River #1

REACH: Reach #1 RS: 142.2

## INPUT

## Description:

| Station | Elevation | Data   | num=    | 40     | Sta     | Elev   | Sta     | Elev   | Sta     | Elev |
|---------|-----------|--------|---------|--------|---------|--------|---------|--------|---------|------|
| 0       | 2235.91   | 2.64   | 2236    | 18.97  | 2236    | 27.87  | 2235.99 | 44.04  | 2235.89 |      |
| 68.75   | 2235.78   | 69.93  | 2235.79 | 84.7   | 2235.98 | 88.52  | 2235.99 | 113.85 | 2236.02 |      |
| 133.86  | 2236.03   | 138.02 | 2236.03 | 148.01 | 2236.04 | 167.14 | 2236.03 | 214.69 | 2236.03 |      |
| 214.69  | 2236      | 256.87 | 2235.03 | 274.15 | 2234.59 | 293.4  | 2234.37 | 297.37 | 2234.27 |      |
| 399.76  | 2234.91   | 412.98 | 2234.84 | 598.05 | 2233.42 | 617.2  | 2233.47 | 682.5  | 2233.54 |      |
| 682.89  | 2233.17   | 704.69 | 2233.31 | 705.65 | 2233.41 | 778.67 | 2233.16 | 784.39 | 2233.8  |      |
| 785.5   | 2233.61   | 792.85 | 2233.52 | 798.37 | 2233.49 | 825.86 | 2233.73 | 834.75 | 2233.72 |      |
| 863.23  | 2233.9    | 867.84 | 2234    | 882.33 | 2234.11 | 926.54 | 2234.45 | 945.75 | 2234.6  |      |

| Manning's n Values |       | num=   | 3     |
|--------------------|-------|--------|-------|
| Sta                | n Val | Sta    | n Val |
| 0                  | .016  | 214.69 | .016  |
| 784.39             |       |        | .025  |

| Bank Sta: | Left | Right  | Lengths: | Left Channel | Right  | Coeff | Contr. | Expan. |
|-----------|------|--------|----------|--------------|--------|-------|--------|--------|
| 214.69    |      | 784.39 | 125.24   | 107.16       | 102.78 |       | .1     | .3     |

## CROSS SECTION

RIVER: River #1

REACH: Reach #1 RS: 141

## INPUT

## Description:

| Station | Elevation | Data   | num=    | 40     | Sta     | Elev   | Sta     | Elev   | Sta     | Elev |
|---------|-----------|--------|---------|--------|---------|--------|---------|--------|---------|------|
| 0       | 2234.07   | 24.59  | 2234.03 | 46.24  | 2233.95 | 71.15  | 2234.03 | 93.55  | 2234    |      |
| 118.63  | 2234.62   | 119.51 | 2234.62 | 136.19 | 2235.09 | 144.94 | 2235.27 | 161.53 | 2235.34 |      |
| 192.7   | 2235.14   | 224.89 | 2234.89 | 236.1  | 2234.74 | 267.79 | 2234.21 | 279.23 | 2234    |      |
| 324.47  | 2234.08   | 396.19 | 2234.19 | 462.52 | 2234.3  | 471.25 | 2234.3  | 630.46 | 2234.3  |      |
| 631.78  | 2234.3    | 650.05 | 2233.27 | 656.55 | 2232.5  | 656.97 | 2232.08 | 658.56 | 2232.17 |      |

## DEV FLOOD ZONE EXHIBIT2 - HEC-RAS.rep

|        |         |        |         |        |         |         |         |         |         |
|--------|---------|--------|---------|--------|---------|---------|---------|---------|---------|
| 716.74 | 2232.74 | 724.58 | 2232.98 | 738.33 | 2232.93 | 738.83  | 2233.43 | 746.35  | 2233.6  |
| 799.93 | 2233.6  | 829.4  | 2233.6  | 831.93 | 2233.25 | 848.08  | 2233.18 | 886.82  | 2233.95 |
| 906.81 | 2233.99 | 920.82 | 2234.21 | 999.04 | 2234.41 | 1001.09 | 2234.46 | 1005.99 | 2234.35 |

Manning's n Values num= 3

| Sta | n Val | Sta    | n Val | Sta   | n Val |
|-----|-------|--------|-------|-------|-------|
| 0   | .016  | 161.53 | .016  | 829.4 | .025  |

| Bank Sta: | Left   | Right | Lengths: | Left Channel | Right | Coeff  | Contr. | Expan. |
|-----------|--------|-------|----------|--------------|-------|--------|--------|--------|
|           | 161.53 | 829.4 |          | 144.44       | 219.1 | 101.89 | .1     | .3     |

CROSS SECTION

RIVER: River #1

REACH: Reach #1 RS: 140

INPUT

Description:

| Station | Elevation | Data    | num=    | 40      | Sta     | Elev    | Sta     | Elev    | Sta     | Elev |
|---------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|------|
| 0       | 2232.09   | 38.26   | 2232    | 56.25   | 2232    | 59.66   | 2232.27 | 68.11   | 2232.56 |      |
| 75.94   | 2232.65   | 93.82   | 2232.52 | 120.45  | 2232.96 | 167.38  | 2233.22 | 187.43  | 2233.5  |      |
| 202.37  | 2233.94   | 224.28  | 2234    | 260.85  | 2234    | 271.02  | 2233.88 | 276.71  | 2234.01 |      |
| 462.65  | 2234.3    | 522.1   | 2234.3  | 589.56  | 2234.3  | 632.24  | 2234.3  | 640.54  | 2233.83 |      |
| 657.08  | 2231.88   | 659.1   | 2231.55 | 700.37  | 2231.96 | 734.07  | 2232.92 | 739     | 2232.93 |      |
| 739.5   | 2233.43   | 747.05  | 2233.6  | 761.6   | 2233.6  | 830.52  | 2233.6  | 856.14  | 2233.27 |      |
| 880.76  | 2233.27   | 906.71  | 2232.76 | 920.66  | 2232.83 | 987.27  | 2234.15 | 995.85  | 2234.28 |      |
| 1009.39 | 2234.23   | 1029.23 | 2234.78 | 1044.89 | 2234.61 | 1056.67 | 2234.33 | 1065.63 | 2233.96 |      |

Manning's n Values num= 3

| Sta | n Val | Sta   | n Val | Sta    | n Val |
|-----|-------|-------|-------|--------|-------|
| 0   | .016  | 75.94 | .016  | 880.76 | .025  |

| Bank Sta: | Left  | Right  | Lengths: | Left Channel | Right | Coeff  | Contr. | Expan. |
|-----------|-------|--------|----------|--------------|-------|--------|--------|--------|
|           | 75.94 | 880.76 |          | 93.91        | 94.87 | 229.34 | .1     | .3     |

CROSS SECTION

RIVER: River #1

REACH: Reach #1 RS: 139

INPUT

Description:

| Station | Elevation | Data    | num=    | 40      | Sta     | Elev   | Sta     | Elev    | Sta     | Elev |
|---------|-----------|---------|---------|---------|---------|--------|---------|---------|---------|------|
| 0       | 2231      | 27.84   | 2230.96 | 29.41   | 2230.91 | 59.34  | 2230.65 | 75.54   | 2230.97 |      |
| 124.84  | 2231.98   | 148.74  | 2232.01 | 195.38  | 2232.01 | 217.01 | 2232.79 | 227.39  | 2232.98 |      |
| 255.14  | 2232.59   | 276.72  | 2232.67 | 295.93  | 2232.61 | 363.53 | 2234.15 | 462.47  | 2234.3  |      |
| 558.59  | 2234.3    | 627.64  | 2234.3  | 633.03  | 2234.17 | 657.11 | 2231.34 | 659.13  | 2231.01 |      |
| 685.33  | 2231.27   | 721.77  | 2232.31 | 723.13  | 2231.16 | 727.72 | 2231.14 | 739.16  | 2231.5  |      |
| 739.59  | 2231.93   | 747.14  | 2232.1  | 848.79  | 2232.1  | 856.84 | 2231.93 | 876.9   | 2232.25 |      |
| 918.42  | 2232.06   | 923.62  | 2232.82 | 970.6   | 2232.33 | 997.29 | 2232.4  | 1039.18 | 2233.02 |      |
| 1079.47 | 2233.39   | 1082.99 | 2233.46 | 1102.96 | 2233.46 | 1124.8 | 2233.17 | 1139.87 | 2232.87 |      |

Manning's n Values num= 3

| Sta | n Val | Sta   | n Val | Sta     | n Val |
|-----|-------|-------|-------|---------|-------|
| 0   | .016  | 59.34 | .016  | 1102.96 | .025  |

| Bank Sta: | Left  | Right   | Lengths: | Left Channel | Right | Coeff  | Contr. | Expan. |
|-----------|-------|---------|----------|--------------|-------|--------|--------|--------|
|           | 59.34 | 1102.96 |          | 85.63        | 83.62 | 125.47 | .1     | .3     |

CROSS SECTION

RIVER: River #1

REACH: Reach #1 RS: 138

INPUT

Description:

| Station | Elevation | Data    | num=    | 40     | Sta     | Elev    | Sta     | Elev    | Sta     | Elev |
|---------|-----------|---------|---------|--------|---------|---------|---------|---------|---------|------|
| 0       | 2230.03   | 23.92   | 2230    | 43.05  | 2229.23 | 52.19   | 2229.59 | 52.19   | 2229.63 |      |
| 56.95   | 2229.58   | 85.16   | 2230.19 | 99.91  | 2230.3  | 102.72  | 2229.81 | 128.16  | 2230.19 |      |
| 197.5   | 2230.59   | 219.18  | 2230.59 | 291.02 | 2230.99 | 365.58  | 2231.42 | 441.02  | 2234.02 |      |
| 453.02  | 2234.29   | 541.78  | 2234.3  | 553.46 | 2233.3  | 562.01  | 2233.18 | 610.13  | 2231.86 |      |
| 638.53  | 2231.83   | 645.93  | 2231.65 | 655.88 | 2230.38 | 664.47  | 2230.47 | 693.54  | 2230.37 |      |
| 735.62  | 2231.43   | 736.13  | 2231.93 | 743.66 | 2232.1  | 845.06  | 2232.1  | 853.09  | 2231.93 |      |
| 894.91  | 2232.59   | 943.35  | 2233.36 | 964.42 | 2233.69 | 983.93  | 2233.65 | 1048.49 | 2231.82 |      |
| 1092.83 | 2231.89   | 1120.72 | 2232.45 | 1140.5 | 2232.36 | 1184.48 | 2233.08 | 1207.31 | 2232.42 |      |

Manning's n Values num= 3

| Sta | n Val | Sta   | n Val | Sta     | n Val |
|-----|-------|-------|-------|---------|-------|
| 0   | .016  | 52.19 | .016  | 1092.83 | .025  |

| Bank Sta: | Left  | Right   | Lengths: | Left Channel | Right | Coeff | Contr. | Expan. |
|-----------|-------|---------|----------|--------------|-------|-------|--------|--------|
|           | 52.19 | 1092.83 |          | 90.27        | 89.23 | 71.84 | .1     | .3     |

## CROSS SECTION

RIVER: River #1  
 REACH: Reach #1 RS: 137

## INPUT

## Description:

| Station | Elevation | Data    | num=    | 37      | Sta     | Elev    | Sta     | Elev    | Sta     | Elev | Sta | Elev |
|---------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|------|-----|------|
| 0       | 2228.62   | 26.35   | 2228.67 | 65.78   | 2228.22 | 65.78   | 2228.15 | 67.85   | 2227.69 |      |     |      |
| 86.66   | 2223.63   | 97.46   | 2225.43 | 113.14  | 2227.53 | 152.59  | 2227.7  | 198.8   | 2228.37 |      |     |      |
| 249.8   | 2229.14   | 284.76  | 2229.61 | 320.99  | 2229.71 | 382.77  | 2230.06 | 403.41  | 2230.29 |      |     |      |
| 457.12  | 2230.87   | 495.54  | 2230.96 | 552.1   | 2230.92 | 594.99  | 2230.29 | 632.95  | 2230.11 |      |     |      |
| 638.73  | 2231.68   | 645.91  | 2229.77 | 693.18  | 2230.38 | 734.83  | 2231.43 | 742.87  | 2232.1  |      |     |      |
| 828.81  | 2232.1    | 852.35  | 2231.93 | 902.95  | 2232.73 | 906.23  | 2231.08 | 960.74  | 2231.74 |      |     |      |
| 1006.67 | 2232      | 1063.13 | 2231.8  | 1103.38 | 2231.47 | 1140.91 | 2231.85 | 1173.34 | 2231.89 |      |     |      |
| 1236    | 2232.27   | 1260.74 | 2231.79 |         |         |         |         |         |         |      |     |      |

| Manning's n | Values | num=  | 3    | Sta    | n Val | Sta | n Val |
|-------------|--------|-------|------|--------|-------|-----|-------|
| 0           | .016   | 65.78 | .035 | 113.14 | .022  |     |       |

| Bank Sta: | Left  | Right  | Lengths: | Left   | Channel | Right  | Coeff | Contr. | Expan. |
|-----------|-------|--------|----------|--------|---------|--------|-------|--------|--------|
|           | 65.78 | 113.14 |          | 218.93 | 220.2   | 221.26 |       | .1     | .3     |

## CROSS SECTION

RIVER: River #1  
 REACH: Reach #1 RS: 135

## INPUT

## Description:

| Station | Elevation | Data    | num=    | 40      | Sta     | Elev    | Sta     | Elev    | Sta     | Elev | Sta | Elev |
|---------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|------|-----|------|
| 0       | 2226.03   | 68.42   | 2225.79 | 70.33   | 2223.89 | 72.64   | 2221.94 | 76.61   | 2222.05 |      |     |      |
| 79.52   | 2221.22   | 82.77   | 2221.22 | 84.32   | 2221.23 | 86.65   | 2221.22 | 89.78   | 2221.21 |      |     |      |
| 96.14   | 2222.1    | 102.82  | 2222.1  | 102.82  | 2224.95 | 154.17  | 2225.6  | 197.03  | 2225.73 |      |     |      |
| 250.17  | 2227.1    | 318.61  | 2227.93 | 350.13  | 2227.96 | 407.87  | 2228.73 | 448.36  | 2228.48 |      |     |      |
| 480.89  | 2228.56   | 541.56  | 2228.18 | 597.24  | 2228.12 | 635.2   | 2227.77 | 674.46  | 2228.55 |      |     |      |
| 718.97  | 2229.7    | 754.11  | 2230.06 | 812.08  | 2230.16 | 871.42  | 2230.32 | 914.85  | 2229.72 |      |     |      |
| 977.48  | 2230.7    | 1029.68 | 2231.51 | 1061.48 | 2232    | 1129.26 | 2232    | 1184.55 | 2231.28 |      |     |      |
| 1237.78 | 2230.23   | 1238.33 | 2230.87 | 1273.27 | 2230.97 | 1340.92 | 2231.05 | 1379.95 | 2230.81 |      |     |      |

| Manning's n | Values | num=  | 3    | Sta    | n Val | Sta | n Val |
|-------------|--------|-------|------|--------|-------|-----|-------|
| 0           | .016   | 68.42 | .035 | 102.82 | .022  |     |       |

| Bank Sta: | Left  | Right  | Coeff | Contr. | Expan. |
|-----------|-------|--------|-------|--------|--------|
|           | 68.42 | 102.82 |       | .1     | .3     |

## SUMMARY OF MANNING'S N VALUES

River: River #1

| Reach    | River Sta. | n1   | n2   | n3   |
|----------|------------|------|------|------|
| Reach #1 | 144        | .016 | .016 | .016 |
| Reach #1 | 142.8      | .016 | .016 | .025 |
| Reach #1 | 142.2      | .016 | .016 | .025 |
| Reach #1 | 141        | .016 | .016 | .025 |
| Reach #1 | 140        | .016 | .016 | .025 |
| Reach #1 | 139        | .016 | .016 | .025 |
| Reach #1 | 138        | .016 | .016 | .025 |
| Reach #1 | 137        | .016 | .035 | .022 |
| Reach #1 | 135        | .016 | .035 | .022 |

## SUMMARY OF REACH LENGTHS

River: River #1

| Reach    | River Sta. | Left   | Channel | Right  |
|----------|------------|--------|---------|--------|
| Reach #1 | 144        | 115.07 | 122.78  | 146.86 |
| Reach #1 | 142.8      | 104.02 | 70.35   | 67.48  |
| Reach #1 | 142.2      | 125.24 | 107.16  | 102.78 |
| Reach #1 | 141        | 144.44 | 219.1   | 101.89 |
| Reach #1 | 140        | 93.91  | 94.87   | 229.34 |
| Reach #1 | 139        | 85.63  | 83.62   | 125.47 |
| Reach #1 | 138        | 90.27  | 89.23   | 71.84  |
| Reach #1 | 137        | 218.93 | 220.2   | 221.26 |
| Reach #1 | 135        |        |         |        |

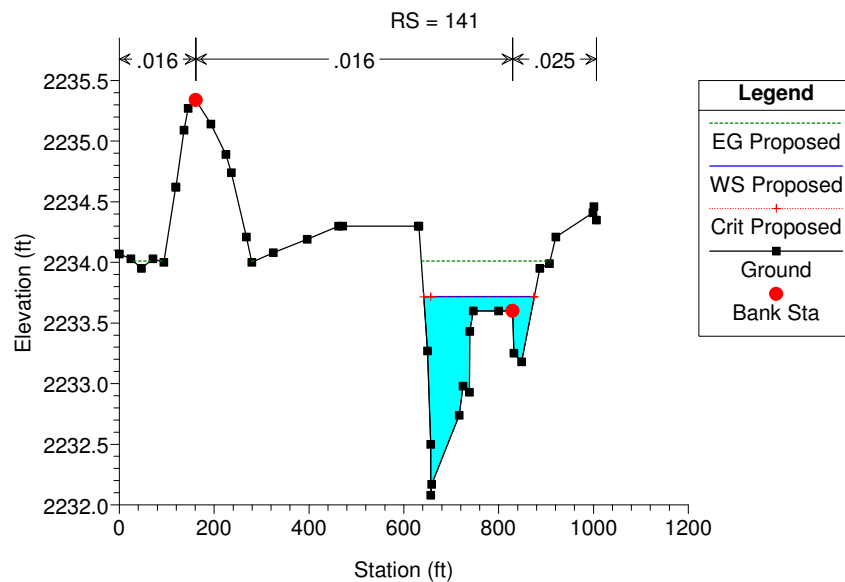
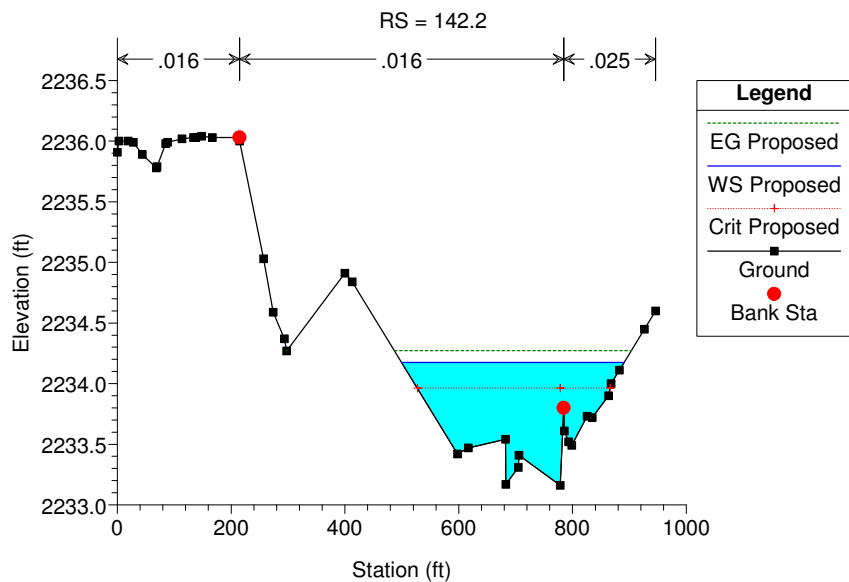
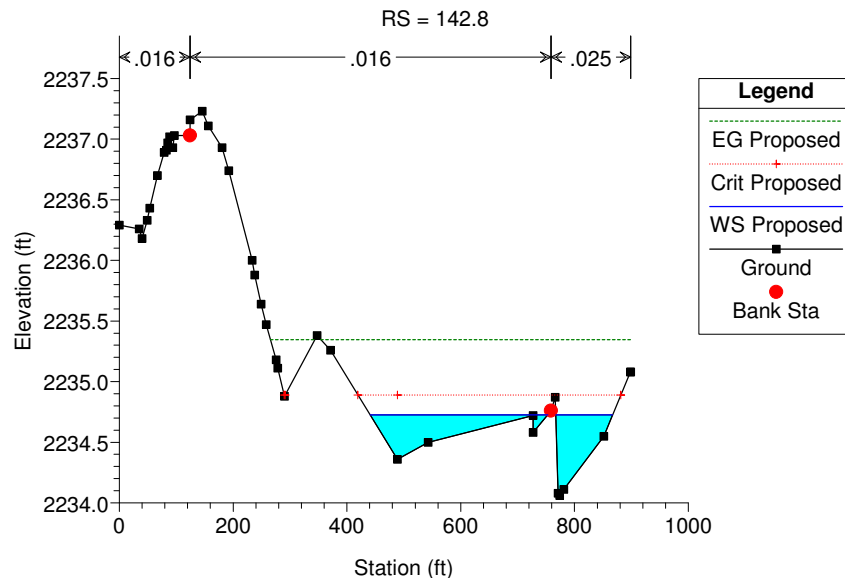
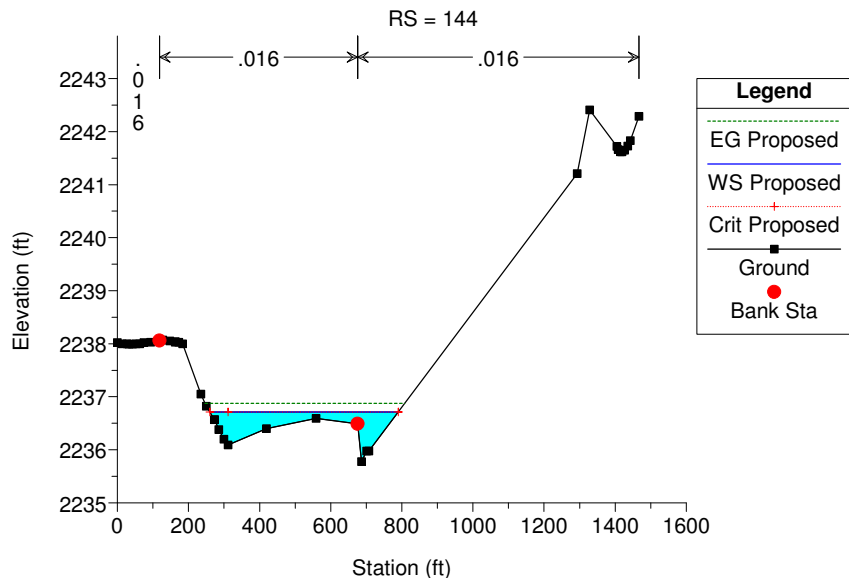
SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS  
River: River #1

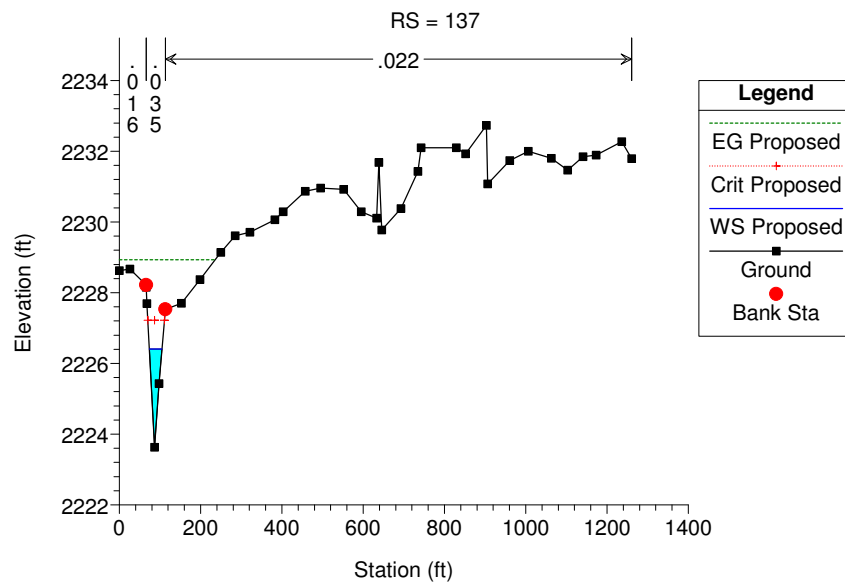
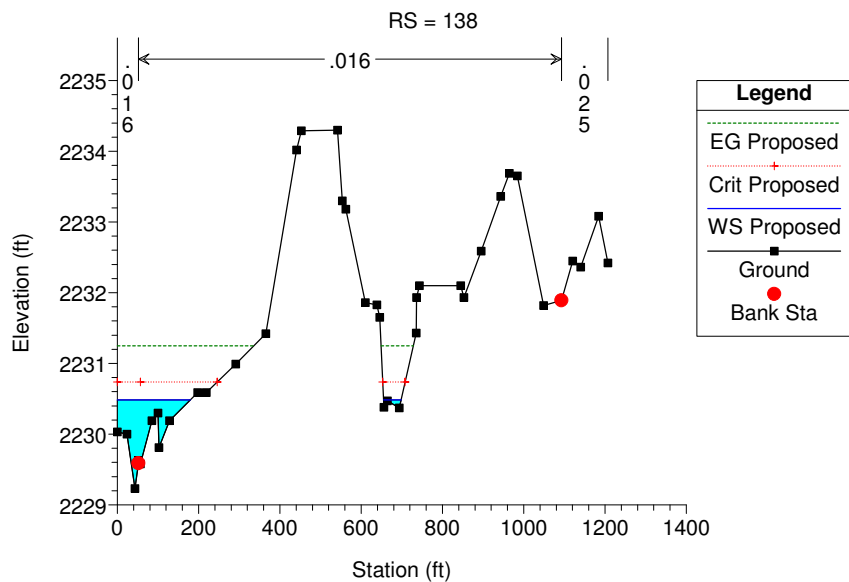
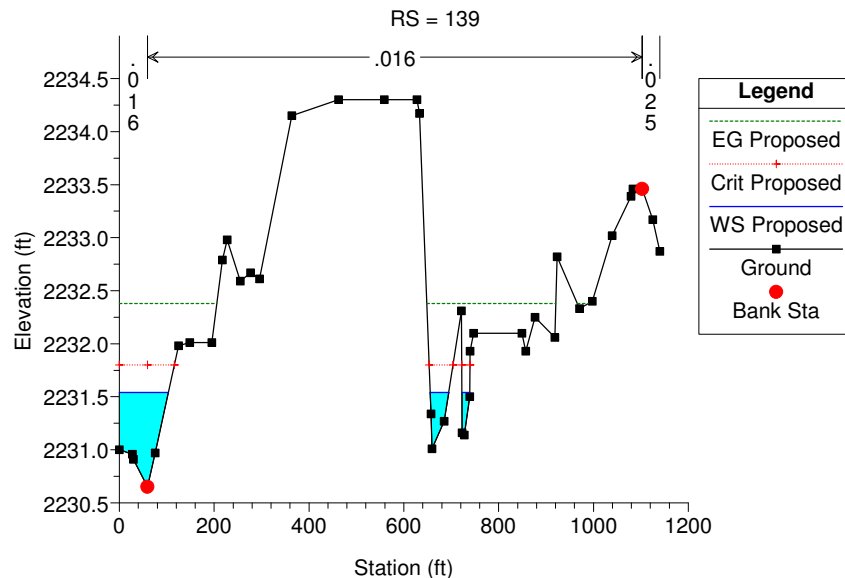
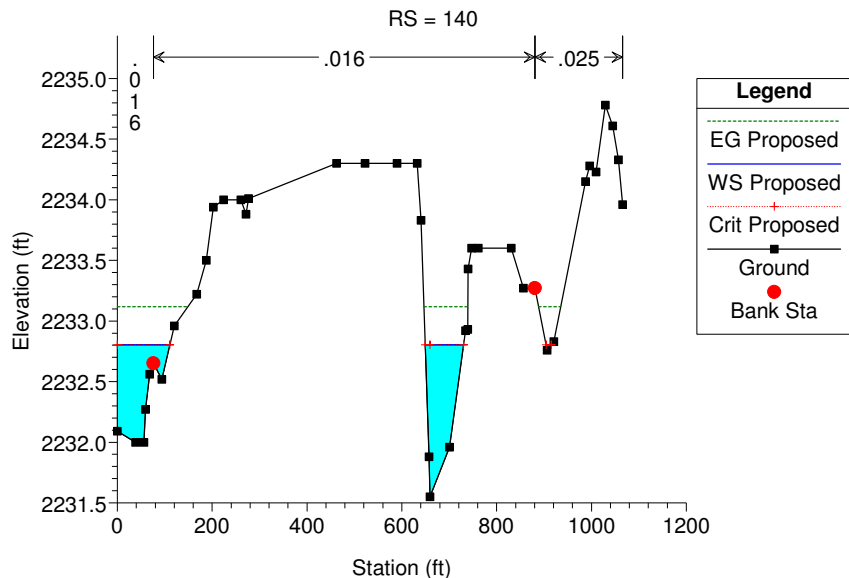
| Reach    | River Sta. | Contr. | Expan. |
|----------|------------|--------|--------|
| Reach #1 | 144        | .1     | .3     |
| Reach #1 | 142.8      | .1     | .3     |
| Reach #1 | 142.2      | .1     | .3     |
| Reach #1 | 141        | .1     | .3     |
| Reach #1 | 140        | .1     | .3     |
| Reach #1 | 139        | .1     | .3     |
| Reach #1 | 138        | .1     | .3     |
| Reach #1 | 137        | .1     | .3     |
| Reach #1 | 135        | .1     | .3     |

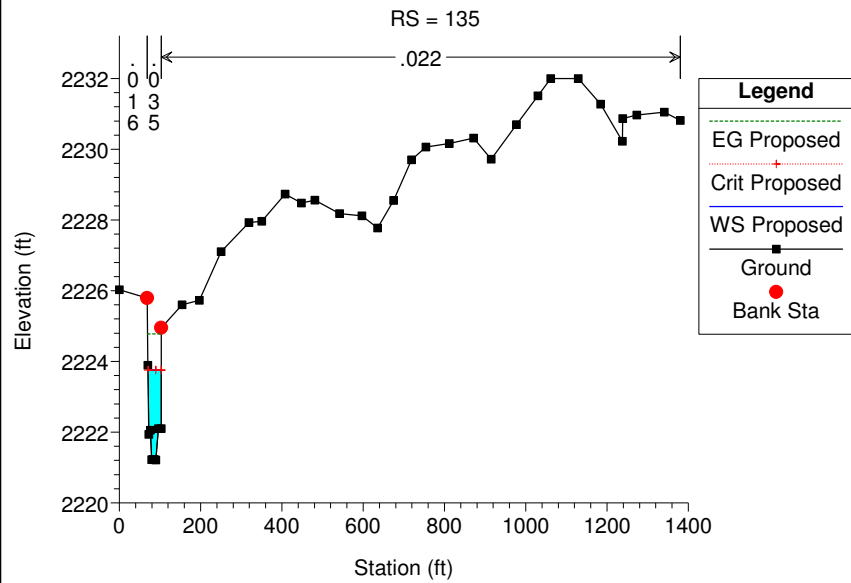
HEC-RAS Plan: Current mode River: River #1 Reach: Reach #1 Profile: Proposed

| Reach    | River Sta | Profile  | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|----------|-----------|----------|---------|-----------|-----------|-----------|-----------|------------|----------|-----------|-----------|--------------|
|          |           |          | (cfs)   | (ft)      | (ft)      | (ft)      | (ft)      | (ft/ft)    | (ft/s)   | (sq ft)   | (ft)      |              |
| Reach #1 | 144       | Proposed | 533.00  | 2236.09   | 2236.71   | 2236.71   | 2236.88   | 0.004809   | 2.78     | 170.91    | 529.54    | 0.92         |
| Reach #1 | 142.8     | Proposed | 533.00  | 2234.36   | 2234.73   | 2234.89   | 2235.35   | 0.049056   | 5.90     | 84.85     | 411.96    | 2.65         |
| Reach #1 | 142.2     | Proposed | 533.00  | 2233.16   | 2234.18   | 2233.96   | 2234.27   | 0.001396   | 2.61     | 227.23    | 391.26    | 0.57         |
| Reach #1 | 141       | Proposed | 533.00  | 2232.08   | 2233.72   | 2233.72   | 2234.01   | 0.004506   | 4.44     | 129.00    | 233.11    | 1.01         |
| Reach #1 | 140       | Proposed | 533.00  | 2231.55   | 2232.80   | 2232.80   | 2233.12   | 0.004462   | 4.34     | 118.74    | 202.58    | 1.00         |
| Reach #1 | 139       | Proposed | 533.00  | 2230.65   | 2231.54   | 2231.80   | 2232.38   | 0.013800   | 5.61     | 76.42     | 159.45    | 1.63         |
| Reach #1 | 138       | Proposed | 533.00  | 2229.58   | 2230.49   | 2230.74   | 2231.25   | 0.012525   | 4.50     | 86.35     | 222.52    | 1.49         |
| Reach #1 | 137       | Proposed | 533.00  | 2223.63   | 2226.41   | 2227.22   | 2228.94   | 0.061920   | 12.75    | 41.79     | 31.00     | 1.94         |
| Reach #1 | 135       | Proposed | 533.00  | 2221.21   | 2223.75   | 2223.76   | 2224.78   | 0.015822   | 8.14     | 65.50     | 32.33     | 1.01         |

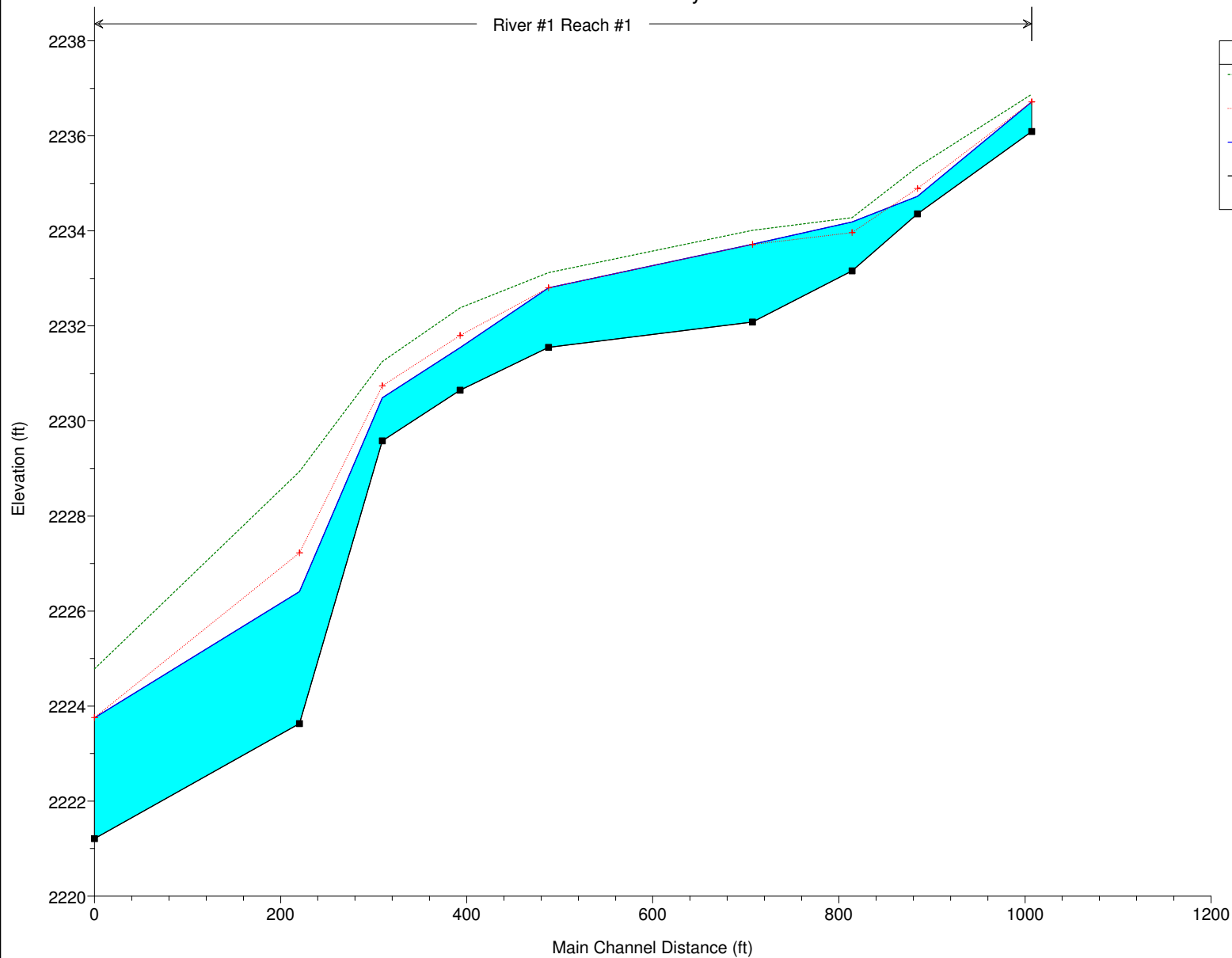




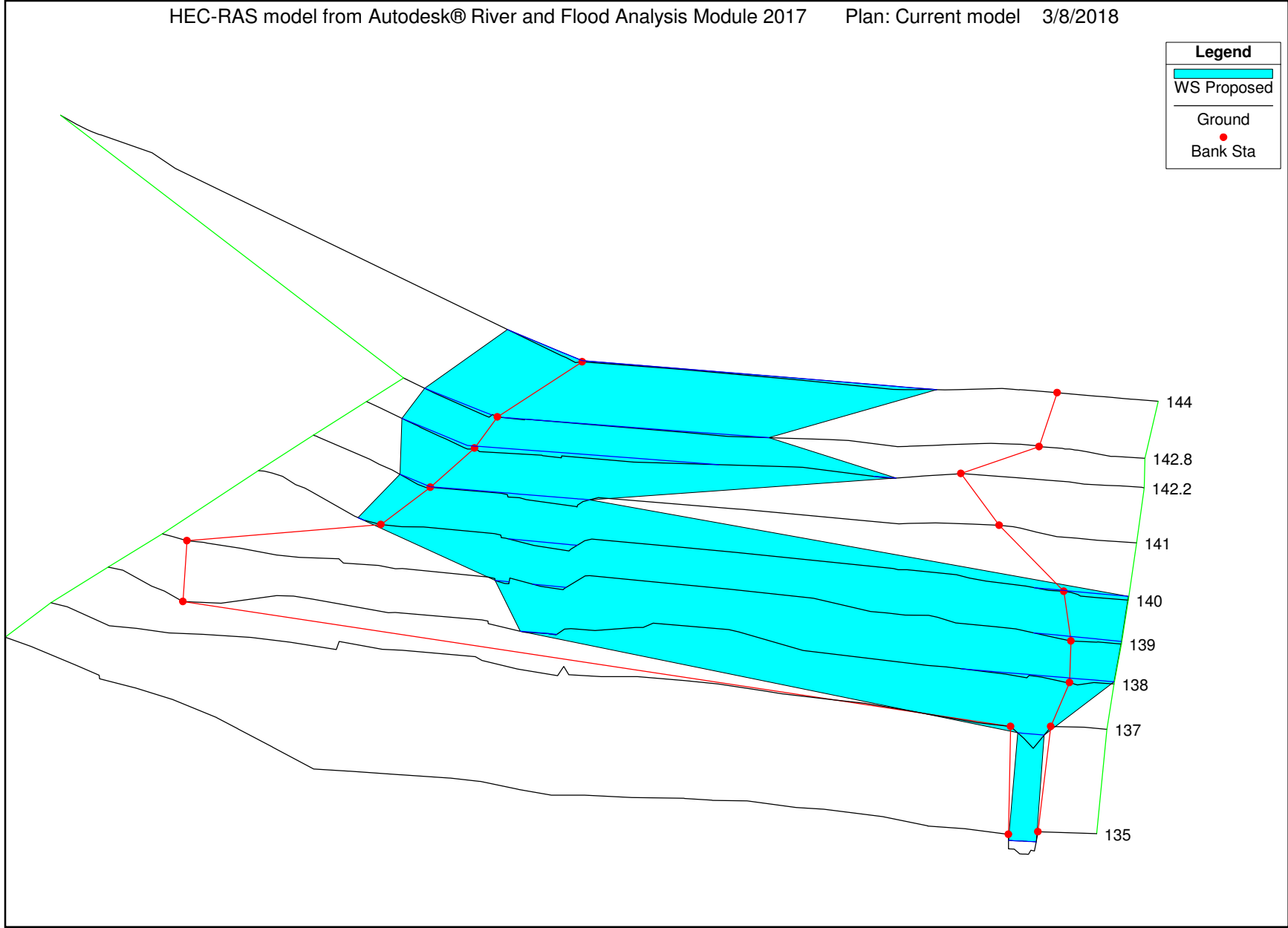
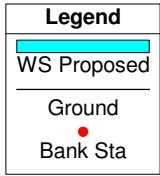




River #1 Reach #1



| Legend        |  |
|---------------|--|
| EG Proposed   |  |
| Crit Proposed |  |
| WS Proposed   |  |
| Ground        |  |



# **APPENDIX D**

## **REFERENCE MATERIAL**

# **City of Las Vegas Comment Letter**



|                                                                            |                                         |                                                                                                   |
|----------------------------------------------------------------------------|-----------------------------------------|---------------------------------------------------------------------------------------------------|
| <b>QCITY OF LAS VEGAS</b>                                                  |                                         | <b>DATE:</b>                                                                                      |
| <b>INTER-OFFICE MEMORANDUM</b>                                             |                                         | February 22, 2018                                                                                 |
| <b>TO:</b><br>Land Development Services<br>Department of Building & Safety |                                         | <b>FROM:</b><br>Albert Sung, P.E.<br>Flood Control Project Engineer<br>Department of Public Works |
| <b>SUBJECT:</b>                                                            | Drainage Study for:                     | <b>COPIES TO:</b>                                                                                 |
|                                                                            | <b>Crystal Park Apartments</b>          | VTN, Nevada                                                                                       |
| <b>Cross Streets:</b>                                                      | SEQ of Cheyenne Boulevard & Michael Way | EAB Investment Company                                                                            |
| <b>File Number:</b>                                                        | F:\Depot\DSMemos\DS4922C.ZNAE.doc       | Bart Anderson, P.E., DevCo                                                                        |
| <b>Parcel Number:</b>                                                      | 138-13-512-001                          | CCRFC                                                                                             |
| <b>Zoning Action:</b>                                                      | SDR-41779 & EOT-71642                   |                                                                                                   |
| <b>FEMA Flood Zone</b>                                                     | YES                                     | NO <b>X</b>                                                                                       |
| <b>Proposed Storm Drain</b>                                                | YES                                     | NO <b>X</b>                                                                                       |

| HISTORY                    | DATE RECEIVED          | DATE REVIEWED | COMMENTS           | REVIEW FEES       | FEES PAID<br>Payment Trn # |
|----------------------------|------------------------|---------------|--------------------|-------------------|----------------------------|
| 1 <sup>st</sup> Submittal  | 10/2/2017 & 10/11/2017 | 10/25/2017    | Not Approved       | \$400.00          | 490395: \$400              |
| 2 <sup>nd</sup> Submittal  | 12/20/2017             | 1/18/2018     | Not Approved       | \$400.00          | 492266: \$400              |
| 3 <sup>rd</sup> Submittal  | 2/13/2018              | 2/22/2018     | See Comments Below | \$400.00          | 493368: \$400              |
| <b>TOTAL FEES (LDDRS):</b> |                        |               |                    | <b>\$1,200.00</b> | ----                       |

#### REMARKS:

#### Next submittal requires a meeting with Flood Control to review Flood Zone impacts

The Drainage Study for the subject project has been reviewed and:

|          |                                                                                                |
|----------|------------------------------------------------------------------------------------------------|
|          | is approved subject to conformance to all City standards and the following conditions:         |
| <b>X</b> | must be resubmitted or supplemented including the following:                                   |
|          | is conditionally approved subject to Clark County Regional Flood Control District concurrence. |
|          | is conditionally approved subject to Clark County Public Works Department concurrence.         |

1. Since the project is within a FEMA Flood Zone AE, *Clark County Regional Flood Control District* (CCRFC) concurrence is required prior to the final approval of the drainage study by the *City of Las Vegas*.
2. The last submittal of interpolated BFEs at various stations between the northern and southern ends of the project as the basis to revise the FEMA Flood Zone delineation is not acceptable. A proper hydraulic model such as HEC-RAS built on the FEMA FIS study must be utilized for the additional stations in both existing and proposed conditions. Review and revise accordingly.
3. The engineer/developer has submitted a cost estimate of \$228,614.84 in lieu of the construction of a required storm drain system in the frontage of the subject site in *Michael Way*. The contribution money will be collected prior to the final approval of the improvement plans.
4. This drainage study assumes that the project will be constructed in one phase. If improvement plans are submitted to break the project into separate phases, a drainage study update will be required for each phase addressing the interim condition.

The Engineer is to provide addresses for each lot in a FEMA Flood Hazard Zone prior to obtaining a grading permit. This information is necessary to insure that the elevation certificates are provided for each address prior to completion of construction.

**NOTE: The engineer must submit the drainage study to FEMA for a Conditional Letter of Map Revision (CLOMR). A favorable CLOMR must be obtained prior to the issuance of any permits.** This site is located in a **FEMA Zone A**. *Clark County Regional Flood Control District (CCRFCD)* review and approval is required prior to recordation of final map or issuance of building/grading permits. The Engineer must send a copy of the report to the CCRFCD for review. **The developer/engineer must also obtain a Letter of Map Revision (LOMR) using the approved drainage study as technical support to inform FEMA of the modifications within the flood zone. The approved LOMR must be submitted to the City of Las Vegas prior to the release of the bond.** FEMA Elevation Certificates, showing as-built finish floor elevations, must be completed for each building in the FEMA A Zone. The certificate must be submitted to the *City of Las Vegas Flood Control Section* prior to scheduling a framing inspection.

**NOTE:** Please be advised that all land surface area disturbances over 1 acre or any area adjacent to a water way must submit to the *Nevada Division of Environmental Protection* a "Notice of Intent" to discharge that certifies a stormwater pollution prevention plan has been developed and is maintained on site; for inclusion in the Stormwater General Permit No. NVR100000. A phased construction unit in a contiguous subdivision is considered under construction until all stripped or disturbed surface areas have been covered by paving, building construction or planting. For more information, including forms and applications see <http://ndep.nv.gov/bwpc/storm01.htm> or call (775) 687-9429.

**END OF REMARKS**  
ays

T/R/S: T20S/R60E/13  
AREA L-13

# **FIS HEC-RAS**

HEC-RAS Version 4.1.0 Jan 2010  
 U.S. Army Corps of Engineers  
 Hydrologic Engineering Center  
 609 Second Street  
 Davis, California

```

X   X   XXXXXX   XXXX   XXXX   XX   XXXX
X   X   X       X   X   X   X   X   X
X   X   X       X   X   X   X   X   X
XXXXXXX XXXX   X       XXX XXXX   XXXXXX   XXXX
X   X   X   X   X   X   X   X   X   X   X
X   X   X       X   X   X   X   X   X   X
X   X   XXXXXX   XXXX   X   X   X   X   XXXXX

```

## PROJECT DATA

Project Title: LOWER RANCHO STREET ONLY082806  
 Project File : lowranch082806.prj  
 Run Date and Time: 2/9/2018 7:42:29 AM

Project in English units

Project Description:  
 redefine banks at Michael

## PLAN DATA

Plan Title: Plan 01  
 Plan File : H:\7844\Drainage\3\_ADD2\C-Hydraulics\lowranch082806.p01

Geometry Title: Geom 01  
 Geometry File : H:\7844\Drainage\3\_ADD2\C-Hydraulics\lowranch082806.g01

Flow Title : LOWER RANCHO  
 Flow File : H:\7844\Drainage\3\_ADD2\C-Hydraulics\lowranch082806.f01

## Plan Summary Information:

Number of: Cross Sections = 50 Multiple Openings = 0  
 Culverts = 8 Inline Structures = 0  
 Bridges = 0 Lateral Structures = 0

## Computational Information

Water surface calculation tolerance = 0.01  
 Critical depth calculation tolerance = 0.01  
 Maximum number of iterations = 20  
 Maximum difference tolerance = 0.3  
 Flow tolerance factor = 0.001

## Computation Options

Critical depth computed only where necessary  
 Conveyance Calculation Method: At breaks in n values only  
 Friction Slope Method: Average Conveyance  
 Computational Flow Regime: Mixed Flow

## FLOW DATA

Flow Title: LOWER RANCHO  
 Flow File : H:\7844\Drainage\3\_ADD2\C-Hydraulics\lowranch082806.f01

## Flow Data (cfs)

| River  | Reach | RS       | Effective | Proposed |
|--------|-------|----------|-----------|----------|
| Rancho | lower | 17703.33 | 966       | 761      |
| Rancho | lower | 17497.06 | 966       | 360      |
| Rancho | lower | 17173.04 | 1207      | 439      |
| Rancho | lower | 16542.69 | 2037      | 830      |
| Rancho | lower | 16236.51 | 2121      | 723      |
| Rancho | lower | 15706.68 | 2121      | 723      |
| Rancho | lower | 15031.36 | 1270      | 463      |
| Rancho | lower | 14411.04 | 1499      | 533      |
| Rancho | lower | 13841.4  | 1499      | 533      |
| Rancho | lower | 12719.33 | 1286      | 495      |
| Rancho | lower | 11608.09 | 1441      | 742      |
| Rancho | lower | 11200    | 1418      | 1        |
| Rancho | lower | 9875.193 | 1418      | 1        |
| Rancho | lower | 8765.933 | 1418      | 63       |
| Rancho | lower | 7977.189 | 1150      | 150      |
| Rancho | lower | 7607.411 | 1097      | 1        |
| Rancho | lower | 7190.137 | 478       | 1        |

|        |       |          |     |     |
|--------|-------|----------|-----|-----|
| Rancho | lower | 6800     | 478 | 81  |
| Rancho | lower | 6584.101 | 278 | 1   |
| Rancho | lower | 5560.176 | 125 | 141 |
| Rancho | lower | 4255.943 | 123 | 138 |
| Rancho | lower | 1723.771 | 322 | 364 |
| Rancho | lower | 907.9108 | 301 | 15  |

lowranch082806.rep

#### Boundary Conditions

|        |       |           |                  |                  |
|--------|-------|-----------|------------------|------------------|
| River  | Reach | Profile   | Upstream         | Downstream       |
| Rancho | lower | Effective | Normal S = 0.003 | Normal S = 0.003 |

#### GEOMETRY DATA

Geometry Title: Geom 01

Geometry File : H:\7844\Drainage\3\_ADD2\C-Hydraulics\lowranch082806.g01

#### CROSS SECTION

RIVER: Rancho

REACH: lower RS: 17703.33

#### INPUT

Description: Equals Sta. 0+00 in Upper Rancho Model

| Station | Elevation | Data   | num=    | 21     |
|---------|-----------|--------|---------|--------|
| Sta     | Elev      | Sta    | Elev    | Sta    |
| 0       | 2254.26   | 17.16  | 2254.31 | 17.7   |
| 34.72   | 2253.97   | 36.93  | 2253.93 | 37.41  |
| 216.02  | 2252.85   | 291.5  | 2253.38 | 296.56 |
| 355.77  | 2254.75   | 357.36 | 2254.78 | 378.25 |
| 383.81  | 2259.62   |        |         |        |

Manning's n Values

| Sta | n Val | Sta | n Val | Sta    | n Val |
|-----|-------|-----|-------|--------|-------|
| 0   | .02   | 0   | .03   | 383.81 | .04   |

| Bank Sta: Left | Right  | Lengths: Left | Channel | Right  | Coeff | Contr. | Expan. |
|----------------|--------|---------------|---------|--------|-------|--------|--------|
| 0              | 383.81 | 207.42        | 205.22  | 203.22 | .1    | .3     |        |

Ineffective Flow num= 1

| Sta L  | Sta R  | Elev | Permanent |
|--------|--------|------|-----------|
| 114.39 | 383.81 | 2258 | F         |

#### CROSS SECTION

RIVER: Rancho

REACH: lower RS: 17497.06

#### INPUT

Description:

| Station | Elevation | Data    | num=    | 100     |
|---------|-----------|---------|---------|---------|
| Sta     | Elev      | Sta     | Elev    | Sta     |
| 0       | 2247.91   | 10.15   | 2247.81 | 41.97   |
| 102.31  | 2248.4    | 103.93  | 2248.63 | 109.61  |
| 126.5   | 2250.75   | 127.85  | 2250.72 | 128.02  |
| 150.53  | 2251.57   | 161.44  | 2251.84 | 167.15  |
| 214.56  | 2251.9    | 215.07  | 2251.91 | 216.61  |
| 248.78  | 2252.64   | 254.7   | 2252.73 | 256.97  |
| 276.46  | 2253.3    | 280.22  | 2253.42 | 290.57  |
| 309.16  | 2253.2    | 316.43  | 2252.98 | 361.91  |
| 428.12  | 2252.96   | 454.03  | 2253.03 | 487.69  |
| 707.93  | 2253.23   | 736.75  | 2254.06 | 759.48  |
| 845.5   | 2258.86   | 852.38  | 2258.85 | 868.82  |
| 910.84  | 2257.86   | 911.28  | 2257.89 | 916.13  |
| 934.18  | 2259.33   | 986.61  | 2259.13 | 1040.9  |
| 1158.12 | 2256.93   | 1188.72 | 2257.12 | 1189.03 |
| 1209.13 | 2258.59   | 1229.02 | 2258.88 | 1250.77 |
| 1277.6  | 2258.56   | 1282.76 | 2257.45 | 1322.02 |
| 1342.35 | 2259.49   | 1343.52 | 2259.59 | 1344.45 |
| 1346.41 | 2259.78   | 1346.9  | 2259.81 | 1347.35 |
| 1356.26 | 2259.81   | 1358.95 | 2259.81 | 1435.46 |
| 1525.81 | 2259.98   | 1606.86 | 2259.71 | 1614.95 |

Manning's n Values

| Sta | n Val | Sta    | n Val | Sta    | n Val |
|-----|-------|--------|-------|--------|-------|
| 0   | .02   | 421.68 | .03   | 509.42 | .04   |

| Bank Sta: Left | Right  | Lengths: Left | Channel | Right  | Coeff | Contr. | Expan. |
|----------------|--------|---------------|---------|--------|-------|--------|--------|
| 421.68         | 509.42 | 323.48        | 324.72  | 325.82 | .1    | .3     |        |

Ineffective Flow num= 6

| Sta L  | Sta R  | Elev | Permanent |
|--------|--------|------|-----------|
| 0      | 362    | 2258 | F         |
| 483.96 | 759.61 | 2258 | F         |

RIVER: Rancho  
REACH: lower RS: 17173.04

[illegible]

|           |        |        |          |        |         |        |       |        |        |
|-----------|--------|--------|----------|--------|---------|--------|-------|--------|--------|
| Bank Sta: | Left   | Right  | Lengths: | Left   | Channel | Right  | Coeff | Contr. | Expan. |
|           | 193.58 | 316.11 |          | 630.28 | 630.4   | 630.48 |       | .1     | .3     |

RIVER: Rancho  
REACH: lower RS: 16542.69

| Station | Elevation | Data   | num=    | 118    |         |        |         |        |         |     |      |
|---------|-----------|--------|---------|--------|---------|--------|---------|--------|---------|-----|------|
| Sta     | Elev      | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    | Sta | Elev |
| 0       | 2248.09   | 14.44  | 2248.29 | 14.64  | 2248.29 | 15.46  | 2248.3  | 32.04  | 2248.43 |     |      |
| 39.23   | 2247.89   | 40.59  | 2247.82 | 79.67  | 2248.48 | 101.28 | 2248.57 | 122.91 | 2248.55 |     |      |
| 159.67  | 2248.18   | 164.58 | 2248.24 | 227.27 | 2249.47 | 227.84 | 2249.46 | 243.04 | 2249.08 |     |      |
| 248.51  | 2249.16   | 268.11 | 2249.42 | 273.75 | 2249.63 | 293.22 | 2250.31 | 298.54 | 2250.23 |     |      |
| 312.52  | 2249.91   | 319.46 | 2249.79 | 327.81 | 2249.73 | 347.61 | 2249.75 | 348.2  | 2249.73 |     |      |
| 352.42  | 2249.81   | 352.69 | 2249.8  | 355.67 | 2249.83 | 358.18 | 2249.84 | 358.74 | 2249.84 |     |      |
| 375.81  | 2249.97   | 376.19 | 2249.97 | 402.77 | 2250.21 | 405.61 | 2250.27 | 408.99 | 2250.29 |     |      |
| 436.52  | 2250.54   | 439.48 | 2250.55 | 455.92 | 2250.64 | 459.43 | 2250.65 | 475.49 | 2250.73 |     |      |
| 478.52  | 2250.76   | 481.41 | 2250.85 | 484.89 | 2250.88 | 488.46 | 2250.86 | 496.73 | 2250.84 |     |      |
| 498.48  | 2250.84   | 505.75 | 2250.81 | 507.35 | 2250.89 | 530.03 | 2251.03 | 533.9  | 2251.08 |     |      |
| 537.62  | 2251.87   | 538.45 | 2252.08 | 545.64 | 2252.51 | 552.37 | 2252.95 | 553.54 | 2252.89 |     |      |
| 559.2   | 2252.58   | 560.06 | 2252.54 | 571.36 | 2252.77 | 607.96 | 2253.6  | 612.11 | 2253.71 |     |      |
| 618.19  | 2253.85   | 654.69 | 2252.85 | 656.82 | 2252.92 | 668.35 | 2253.31 | 672.09 | 2253.24 |     |      |
| 688.65  | 2253.17   | 788.49 | 2252.72 | 716.84 | 2252.65 | 719.73 | 2252.52 | 726.01 | 2252.17 |     |      |
| 729.71  | 2251.99   | 745.97 | 2252.04 | 774.89 | 2252.25 | 802.13 | 2252.05 | 805.54 | 2252.08 |     |      |
| 808.97  | 2252.08   | 818.59 | 2252.32 | 819.78 | 2252.33 | 836.16 | 2252.6  | 837.56 | 2252.66 |     |      |
| 839.08  | 2252.69   | 857.59 | 2252.96 | 859.42 | 2253.01 | 862.68 | 2253.06 | 870.93 | 2253.25 |     |      |
| 874.29  | 2253.27   | 890.25 | 2253.54 | 892.05 | 2253.55 | 910.52 | 2253.98 | 913.11 | 2254.02 |     |      |

|         |         |         |         |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 916.82  | 2254.16 | 954.23  | 2254.97 | 954.75  | 2254.98 | 954.91  | 2254.98 | 962.85  | 2255.08 |
| 971.09  | 2255.06 | 1018.14 | 2255.2  | 1019.88 | 2255.22 | 1055.57 | 2255.55 | 1067.32 | 2255.73 |
| 1088.85 | 2255.85 | 1090.93 | 2255.9  | 1114.34 | 2256.5  | 1124.47 | 2256.41 | 1155.34 | 2256.21 |
| 1164.23 | 2256.45 | 1167.22 | 2256.51 | 1206.9  | 2256.25 | 1224.4  | 2255.95 | 1229.29 | 2255.75 |
| 1235.62 | 2255.21 | 1252.28 | 2254.21 | 1302    | 2254.69 | 1317.88 | 2255.49 | 1329.65 | 2256.15 |
| 1337.68 | 2256.12 | 1437.96 | 2256.19 | 1489.06 | 2255.81 |         |         |         |         |

Manning's n Values num= 3

| Sta | n Val | Sta    | n Val | Sta    | n Val |
|-----|-------|--------|-------|--------|-------|
| 0   | .02   | 552.37 | .03   | 656.82 | .03   |

| Bank Sta:        | Left    | Right  | Lengths:  | Left Channel | Right  | Coeff | Contr. | Expan. |
|------------------|---------|--------|-----------|--------------|--------|-------|--------|--------|
|                  | 552.37  | 656.82 |           | 306.18       | 306.18 |       | .1     | .3     |
| Ineffective Flow |         |        | num=      | 4            |        |       |        |        |
| Sta L            | Sta R   | Elev   | Permanent |              |        |       |        |        |
| 0                | 558     | 2257   | F         |              |        |       |        |        |
| 840              | 1103.69 | 2256   | F         |              |        |       |        |        |
| 1103.69          | 1249.48 | 2257   | F         |              |        |       |        |        |
| 1309.36          | 1489.06 | 2257   | F         |              |        |       |        |        |

## CROSS SECTION

RIVER: Rancho

REACH: lower RS: 16236.51

## INPUT

Description:

| Station | Elevation | Data    | num=    | 156     | Sta     | Elev    | Sta     | Elev    | Sta     | Elev |
|---------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|------|
| 0       | 2248.72   | 12.37   | 2248.84 | 45.27   | 2249.19 | 58.31   | 2249.32 | 67.5    | 2249.29 |      |
| 100.17  | 2249.53   | 129.28  | 2249.67 | 135.49  | 2249.83 | 137.15  | 2249.95 | 140.1   | 2250.15 |      |
| 141.26  | 2250.46   | 141.77  | 2250.57 | 143.31  | 2250.58 | 175.53  | 2250.9  | 202.79  | 2250.99 |      |
| 230.54  | 2251.22   | 251.08  | 2251.3  | 281.14  | 2251.56 | 306.06  | 2251.89 | 306.54  | 2251.93 |      |
| 320.62  | 2252.15   | 321.02  | 2252.18 | 332.63  | 2252.66 | 332.85  | 2252.67 | 333.11  | 2252.67 |      |
| 333.35  | 2252.66   | 335.97  | 2252.86 | 338.5   | 2252.95 | 346.36  | 2253.27 | 346.98  | 2253.28 |      |
| 347.6   | 2253.27   | 350.61  | 2253.23 | 351.21  | 2253.23 | 351.79  | 2253.23 | 355.45  | 2253.04 |      |
| 356.03  | 2253.03   | 356.58  | 2253.03 | 357.09  | 2253.02 | 359.76  | 2252.82 | 360.3   | 2252.8  |      |
| 363.52  | 2252.87   | 374.73  | 2253.09 | 406.6   | 2253.77 | 408.73  | 2253.76 | 428.94  | 2253.7  |      |
| 454.21  | 2253.06   | 465.46  | 2252.78 | 469.25  | 2252.94 | 475.62  | 2253.19 | 479.59  | 2253.4  |      |
| 492.94  | 2254.5    | 494.87  | 2254.64 | 495.71  | 2254.62 | 506.98  | 2254.58 | 515.27  | 2254.5  |      |
| 519.47  | 2254.07   | 521.1   | 2254.03 | 521.33  | 2254.03 | 540.82  | 2253.94 | 552.74  | 2253.89 |      |
| 553.21  | 2253.89   | 553.71  | 2253.89 | 588     | 2253.85 | 592.97  | 2253.85 | 594.14  | 2253.86 |      |
| 614.18  | 2253.85   | 626.47  | 2253.7  | 637.78  | 2253.58 | 648.4   | 2253.46 | 663.52  | 2253.12 |      |
| 672.65  | 2252.98   | 678.34  | 2253.08 | 700.32  | 2252.47 | 704.14  | 2252.45 | 709.79  | 2252.52 |      |
| 717.5   | 2252.48   | 727.45  | 2251.4  | 735.65  | 2250.6  | 736.51  | 2250.55 | 741.9   | 2250.63 |      |
| 777.7   | 2251.01   | 802.18  | 2251.24 | 807.89  | 2251.5  | 809.56  | 2251.57 | 811.42  | 2251.84 |      |
| 823.36  | 2253.76   | 832.4   | 2253.76 | 849.21  | 2253.65 | 859.32  | 2253.65 | 872.61  | 2253.74 |      |
| 897.29  | 2253.74   | 907.12  | 2253.87 | 925     | 2254.07 | 937.25  | 2254.03 | 959.06  | 2253.96 |      |
| 959.58  | 2253.96   | 960.71  | 2253.98 | 961.72  | 2253.95 | 1007.1  | 2253.34 | 1012.71 | 2253.3  |      |
| 1020.02 | 2253.17   | 1047.27 | 2253.01 | 1050.39 | 2253    | 1055.66 | 2252.96 | 1063.02 | 2252.92 |      |
| 1079.96 | 2252.82   | 1090.99 | 2252.86 | 1095.62 | 2252.84 | 1114.69 | 2252.84 | 1118.31 | 2252.84 |      |
| 1141.81 | 2252.91   | 1147.84 | 2252.94 | 1161.44 | 2252.9  | 1180    | 2252.86 | 1180.72 | 2252.82 |      |
| 1181.57 | 2252.78   | 1189.88 | 2252.47 | 1194    | 2252.41 | 1202.71 | 2252.28 | 1204.06 | 2252.25 |      |
| 1206.73 | 2252.26   | 1213.12 | 2252.35 | 1213.55 | 2252.35 | 1223.32 | 2252.47 | 1231.33 | 2252.5  |      |
| 1231.48 | 2252.5    | 1232.12 | 2252.49 | 1239.93 | 2252.52 | 1243.44 | 2252.54 | 1248.29 | 2252.73 |      |
| 1249.21 | 2252.7    | 1256.86 | 2252.45 | 1257.19 | 2252.42 | 1262.17 | 2252.69 | 1266.39 | 2252.7  |      |
| 1274.66 | 2252.84   | 1294.36 | 2252.97 | 1312.92 | 2253.06 | 1317.59 | 2253.09 | 1322.8  | 2253.04 |      |
| 1324.34 | 2253.06   | 1328.57 | 2253.05 | 1329.4  | 2253.05 | 1335.14 | 2253.1  | 1336.2  | 2253.11 |      |
| 1341.84 | 2253.14   | 1360.72 | 2253.17 | 1366.91 | 2253.2  | 1386.94 | 2253.29 | 1393.71 | 2253.32 |      |
| 1400.44 | 2253.35   | 1415.31 | 2253.45 | 1422.48 | 2253.47 | 1428.77 | 2253.55 | 1436.65 | 2253.61 |      |
| 1439.44 | 2253.65   |         |         |         |         |         |         |         |         |      |

Manning's n Values num= 3

| Sta | n Val | Sta    | n Val | Sta    | n Val |
|-----|-------|--------|-------|--------|-------|
| 0   | .02   | 465.46 | .03   | 823.36 | .04   |

| Bank Sta:        | Left        | Right  | Lengths:  | Left Channel | Right  | Coeff | Contr. | Expan. |
|------------------|-------------|--------|-----------|--------------|--------|-------|--------|--------|
|                  | 465.46      | 823.36 |           | 530.21       | 529.83 |       | .1     | .3     |
| Ineffective Flow |             |        | num=      | 3            |        |       |        |        |
| Sta L            | Sta R       | Elev   | Permanent |              |        |       |        |        |
| 0                | 406         | 2255   | F         |              |        |       |        |        |
| 503.46           | 7092254.595 |        | F         |              |        |       |        |        |
| 817.61           | 1439.45     | 2255   | F         |              |        |       |        |        |

## CROSS SECTION

RIVER: Rancho

REACH: lower RS: 15706.68

## INPUT

Description: Left bank is west side of Rancho.

| Station | Elevation | Data   | num=    | 121    | Sta     | Elev   | Sta     | Elev   | Sta     | Elev |
|---------|-----------|--------|---------|--------|---------|--------|---------|--------|---------|------|
| 0       | 2246.89   | .83    | 2246.89 | 43.3   | 2247.14 | 45.07  | 2247.16 | 47.97  | 2247.16 |      |
| 115.65  | 2247.27   | 150.94 | 2247.37 | 184.36 | 2247.4  | 200.32 | 2247.36 | 219.56 | 2247.41 |      |
| 229.63  | 2247.34   | 252.48 | 2247.46 | 269.03 | 2247.51 | 296.14 | 2247.42 | 329.73 | 2247.76 |      |
| 331.3   | 2247.77   | 332.52 | 2247.78 | 356.28 | 2247.73 | 356.34 | 2247.73 | 358.45 | 2247.9  |      |

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|         |         |         |         |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 359.06  | 2247.92 | 362.04  | 2247.96 | 379.6   | 2247.9  | 381.52  | 2247.85 | 400.04  | 2247.51 |
| 408.14  | 2247.68 | 414.6   | 2247.79 | 427.05  | 2248.47 | 431.45  | 2248.81 | 435.78  | 2248.87 |
| 474.61  | 2249.23 | 484.93  | 2249.23 | 501.76  | 2249.28 | 506.92  | 2249.27 | 510.99  | 2249.39 |
| 513.89  | 2249.28 | 547.08  | 2249.37 | 547.91  | 2249.39 | 548.24  | 2249.56 | 549.42  | 2250.15 |
| 550.62  | 2250.15 | 566.08  | 2250.19 | 567.12  | 2250.26 | 567.19  | 2250.17 | 567.41  | 2250.26 |
| 574.38  | 2250.81 | 579.33  | 2251.16 | 584.82  | 2250.76 | 585.36  | 2250.72 | 587.23  | 2250.57 |
| 635.87  | 2251.86 | 646.13  | 2251.79 | 646.37  | 2251.78 | 680.9   | 2251.04 | 681.75  | 2251.02 |
| 683.84  | 2251.12 | 686.96  | 2251.1  | 692.63  | 2251.25 | 700.61  | 2250.98 | 703.19  | 2250.72 |
| 704.43  | 2250.63 | 708.12  | 2250.33 | 712.35  | 2249.95 | 713.79  | 2249.83 | 716.46  | 2249.94 |
| 718.71  | 2249.89 | 727.6   | 2249.89 | 738.64  | 2249.75 | 759.13  | 2249.75 | 804.26  | 2249.56 |
| 815.73  | 2249.61 | 829.31  | 2249.78 | 831.7   | 2249.79 | 882.06  | 2250.57 | 887.68  | 2250.69 |
| 888.82  | 2250.71 | 891.04  | 2250.74 | 946.47  | 2251.85 | 966.86  | 2251.78 | 1001.9  | 2251.99 |
| 1035.96 | 2252.09 | 1040.47 | 2252.06 | 1076.72 | 2251.88 | 1085.72 | 2251.82 | 1094.42 | 2251.84 |
| 1117.55 | 2251.94 | 1126.96 | 2252.09 | 1137.56 | 2252.47 | 1154.74 | 2252.72 | 1158.65 | 2252.77 |
| 1172.76 | 2253.41 | 1193.89 | 2253.33 | 1246.41 | 2253.04 | 1247.79 | 2253.04 | 1249.54 | 2253.03 |
| 1259.38 | 2252.73 | 1269.75 | 2252.39 | 1291.52 | 2252.69 | 1296.45 | 2252.75 | 1335.16 | 2253.01 |
| 1354.16 | 2254.55 | 1354.29 | 2254.56 | 1354.54 | 2254.56 | 1360.77 | 2254.65 | 1427.43 | 2255.53 |
| 1428.23 | 2255.5  | 1436.42 | 2255.15 | 1532.62 | 2255.64 | 1620.09 | 2256.51 | 1620.97 | 2256.54 |
| 1652.96 | 2256.32 | 1657.34 | 2256.31 | 1665.37 | 2256.4  | 1694.38 | 2256.66 | 1711.5  | 2256.77 |
| 1768.98 | 2256.94 | 1783.82 | 2256.92 | 1784.17 | 2256.93 | 1792.96 | 2257.38 | 1803.75 | 2257.4  |
| 1806.74 | 2257.49 |         |         |         |         |         |         |         |         |

Manning's n Values num= 3

| Sta | n Val | Sta    | n Val | Sta    | n Val |
|-----|-------|--------|-------|--------|-------|
| 0   | .02   | 692.63 | .03   | 946.47 | .04   |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
692.63 946.47 207.14 207.14 207.14 .1 .3

Ineffective Flow num= 2

| Sta L   | Sta R   | Elev     | Permanent |
|---------|---------|----------|-----------|
| 0       | 635     | 2254.17  | F         |
| 1347.37 | 1806.74 | 2257.489 | F         |

CROSS SECTION

RIVER: Rancho  
REACH: lower RS: 15499.54

INPUT

Description: Left bank is west curb of Rancho. Only west lane are effective flow area. Rgt bank is west of Sterling channel

| Station | Elevation | Data    | num=    | 107     |         |         |         |         |         |
|---------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|
| Sta     | Elev      | Sta     | Elev    | Sta     | Elev    | Sta     | Elev    | Sta     | Elev    |
| 0       | 2247.13   | 26.05   | 2247.27 | 32.75   | 2247.28 | 38.86   | 2247.32 | 47.38   | 2247.29 |
| 57.41   | 2247.32   | 61.03   | 2247.24 | 64.29   | 2247.25 | 69.38   | 2249.66 | 69.45   | 2249.69 |
| 69.51   | 2249.69   | 91.38   | 2249.8  | 100.81  | 2249.7  | 105.69  | 2249.61 | 115.18  | 2249.61 |
| 120.81  | 2249.51   | 135.8   | 2249.7  | 136.41  | 2249.71 | 150.4   | 2249.92 | 172.03  | 2250.32 |
| 186.16  | 2250.44   | 194.43  | 2250.44 | 222.69  | 2249.79 | 229.55  | 2249.68 | 231.13  | 2249.65 |
| 231.42  | 2249.66   | 242.69  | 2250.13 | 245.92  | 2250.22 | 247.68  | 2250.28 | 249.27  | 2250.37 |
| 250.35  | 2250.42   | 256.37  | 2250.37 | 257.74  | 2250.42 | 263.03  | 2250.41 | 274.1   | 2250.4  |
| 293.22  | 2251.09   | 305.35  | 2251.67 | 308.44  | 2251.67 | 326.03  | 2251.64 | 339.36  | 2251.72 |
| 389.98  | 2252.07   | 413.71  | 2250.35 | 416.13  | 2250.14 | 442.09  | 2249.39 | 444.97  | 2249.32 |
| 450.47  | 2248.86   | 465.58  | 2247.76 | 469.42  | 2247.74 | 515.6   | 2247.93 | 530.81  | 2247.98 |
| 542.71  | 2249.18   | 546.86  | 2249.6  | 550.02  | 2249.84 | 561.11  | 2250.3  | 567.24  | 2250.37 |
| 568.12  | 2250.38   | 582.13  | 2250.57 | 604.86  | 2250.78 | 621.16  | 2250.91 | 656.74  | 2250.67 |
| 658.78  | 2250.66   | 670.01  | 2250.66 | 672.65  | 2250.63 | 678.06  | 2250.22 | 680.83  | 2249.99 |
| 684.21  | 2250.01   | 720.92  | 2250.25 | 763.41  | 2250.42 | 776.96  | 2250.55 | 790.94  | 2250.65 |
| 819.47  | 2251      | 838.95  | 2251.13 | 844.16  | 2251.19 | 849.48  | 2251.26 | 866.39  | 2251.48 |
| 876.32  | 2252.01   | 885.37  | 2252.51 | 944.44  | 2252.28 | 947.02  | 2252.29 | 950.18  | 2252.35 |
| 986.78  | 2253      | 990.67  | 2252.8  | 994.66  | 2252.52 | 1000.64 | 2252.62 | 1030.09 | 2253.24 |
| 1058.92 | 2253.85   | 1064.13 | 2254.04 | 1070.19 | 2254.16 | 1079.56 | 2254.83 | 1091.07 | 2254.86 |
| 1109.8  | 2255.03   | 1131.48 | 2255.1  | 1156.38 | 2255.13 | 1158.16 | 2255.14 | 1201.79 | 2255.47 |
| 1220.45 | 2255.49   | 1229.64 | 2255.59 | 1269.01 | 2255.74 | 1297.84 | 2255.75 | 1307.62 | 2255.6  |
| 1309.59 | 2255.59   | 1322.27 | 2255.74 | 1348.06 | 2256    | 1364.37 | 2256.04 | 1400.52 | 2256.29 |
| 1430.37 | 2256.51   | 1446.98 | 2256.52 |         |         |         |         |         |         |

Manning's n Values num= 3

| Sta | n Val | Sta    | n Val | Sta    | n Val |
|-----|-------|--------|-------|--------|-------|
| 0   | .04   | 231.42 | .03   | 550.02 | .03   |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
231.42 550.02 469.33 468.15 467.1 .1 .3

Ineffective Flow num= 3

| Sta L | Sta R   | Elev | Permanent |
|-------|---------|------|-----------|
| 0     | 186     | 2256 | F         |
| 312   | 387     | 2256 | F         |
| 553   | 1446.98 | 2256 | F         |

CROSS SECTION

RIVER: Rancho  
REACH: lower RS: 15031.36

INPUT

Description: Lft bank is west curb of Rancho Right bank is west of Sterling channel

| Station | Elevation | Data | num= | 136 |
|---------|-----------|------|------|-----|
|---------|-----------|------|------|-----|



| Sta     | Elev    | Sta     | Elev    | Sta     | Elev    | Sta     | Elev    | Sta     | Elev    |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0       | 2243.47 | 11.39   | 2243.33 | 18.81   | 2243.09 | 47.44   | 2243.04 | 53.61   | 2243.04 |
| 57.93   | 2242.98 | 77.11   | 2242.85 | 88.41   | 2242.94 | 105.33  | 2242.89 | 112.37  | 2242.79 |
| 116.8   | 2242.99 | 122.99  | 2243.29 | 126.87  | 2243.46 | 148.94  | 2244.01 | 159.92  | 2243.91 |
| 162.78  | 2243.9  | 164     | 2243.9  | 183.65  | 2244.16 | 190.4   | 2244.24 | 206.66  | 2244.27 |
| 239.05  | 2244.74 | 271.59  | 2245.06 | 286.39  | 2245    | 334.24  | 2245.33 | 335.75  | 2246.12 |
| 341.12  | 2246.5  | 346.64  | 2246.14 | 349.05  | 2246.08 | 360.93  | 2245.7  | 361.12  | 2245.69 |
| 362.91  | 2245.54 | 365.02  | 2245.38 | 366.36  | 2245.4  | 375.09  | 2245.49 | 413.3   | 2245.94 |
| 416.31  | 2245.96 | 418.3   | 2245.95 | 457.95  | 2245.99 | 513.17  | 2245.89 | 538.66  | 2245.75 |
| 542.28  | 2245.75 | 562.77  | 2245.38 | 570.44  | 2245.23 | 599.83  | 2245.87 | 607.18  | 2246    |
| 630.15  | 2246.12 | 666.43  | 2245.43 | 668.8   | 2245.62 | 673.23  | 2245.96 | 673.44  | 2245.98 |
| 678.45  | 2246.41 | 684.18  | 2247.01 | 694.68  | 2247.11 | 696.25  | 2247.12 | 700.73  | 2247.3  |
| 738.7   | 2248.71 | 747.92  | 2248.84 | 756.66  | 2249.11 | 767.08  | 2249.12 | 772.94  | 2249.14 |
| 813.84  | 2249.01 | 850.96  | 2249.29 | 885.57  | 2249.33 | 885.95  | 2249.33 | 886.26  | 2249.31 |
| 922.99  | 2247.57 | 949.92  | 2245.9  | 954.19  | 2245.48 | 958.79  | 2245.31 | 965.63  | 2244.96 |
| 974.95  | 2245.02 | 977.04  | 2245.03 | 994.32  | 2244.94 | 995.22  | 2244.92 | 996.42  | 2245.06 |
| 1002.02 | 2246.05 | 1004.13 | 2246.38 | 1010.67 | 2246.3  | 1019.58 | 2246.13 | 1028.29 | 2245.76 |
| 1032.25 | 2245.73 | 1039.96 | 2245.73 | 1068.3  | 2245.9  | 1072.41 | 2246.46 | 1073.38 | 2246.52 |
| 1075.13 | 2247.74 | 1085.03 | 2247.92 | 1085.69 | 2247.94 | 1100.28 | 2247.9  | 1134.22 | 2248.08 |
| 1178.58 | 2248.14 | 1188.45 | 2248.06 | 1216.12 | 2247.74 | 1226.57 | 2247.66 | 1231.33 | 2247.82 |
| 1267.49 | 2249.3  | 1269.94 | 2249.41 | 1324.62 | 2249.5  | 1368.37 | 2249.28 | 1373.61 | 2249.27 |
| 1376.39 | 2249.26 | 1458.19 | 2249.44 | 1467.9  | 2249.51 | 1516.1  | 2250.28 | 1538.51 | 2250.27 |
| 1560.48 | 2250.52 | 1581.89 | 2251.51 | 1602.26 | 2251.49 | 1673.48 | 2251.77 | 1681.72 | 2251.82 |
| 1685.4  | 2251.69 | 1689.92 | 2251.45 | 1752.81 | 2252.08 | 1754.39 | 2252.1  | 1755.3  | 2252.17 |
| 1766.9  | 2253.21 | 1769.15 | 2253.3  | 1780.32 | 2253.84 | 1833.31 | 2254.24 | 1843.92 | 2254.39 |
| 1865.75 | 2254.36 | 1872.86 | 2254.39 | 1876.64 | 2254.39 | 1890.36 | 2254.41 | 1934.91 | 2254.33 |
| 1939.49 | 2254.33 | 1963.31 | 2254.54 | 1963.44 | 2254.54 | 1963.54 | 2254.55 | 1983.7  | 2254.48 |
| 1998.94 | 2254.56 | 2031.65 | 2254.43 | 2034.17 | 2254.41 | 2035.89 | 2254.38 | 2036.61 | 2254.38 |
| 2057.77 | 2254.3  |         |         |         |         |         |         |         |         |

Manning's n Values num= 3

| Sta | n Val | Sta   | n Val | Sta     | n Val |
|-----|-------|-------|-------|---------|-------|
| 0   | .02   | 668.8 | .03   | 1010.67 | .04   |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
668.8 1010.67 620.28 620.4 620.52 .1 .3

Ineffective Flow num= 6

| Sta L   | Sta R   | Elev     | Permanent |
|---------|---------|----------|-----------|
| 0       | 630     | 2249.34  | F         |
| 1078.24 | 1184    | 2254.3   | F         |
| 1265    | 1353    | 2254.303 | T         |
| 1431    | 1522    | 2254.303 | T         |
| 1582    | 1676    | 2254.303 | T         |
| 1775    | 2057.77 | 2254.303 | T         |

## CROSS SECTION

RIVER: Rancho  
REACH: lower RS: 14411.04

## INPUT

Description: Cheyenne

Station Elevation Data num= 203

| Sta     | Elev    | Sta     | Elev    | Sta     | Elev    | Sta     | Elev    | Sta     | Elev    |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0       | 2237.94 | 2.51    | 2237.97 | 7.38    | 2238.06 | 36.39   | 2238.31 | 37.09   | 2238.32 |
| 53.23   | 2238.2  | 63.69   | 2238.27 | 71.57   | 2238.13 | 99.34   | 2237.88 | 111.3   | 2237.81 |
| 114.18  | 2237.82 | 122.85  | 2237.75 | 137.71  | 2237.7  | 141.66  | 2237.48 | 147.7   | 2237.17 |
| 159.95  | 2236.47 | 164.81  | 2236.42 | 166.27  | 2236.38 | 168.67  | 2236.32 | 171.33  | 2236.27 |
| 179.8   | 2235.98 | 181.32  | 2235.87 | 186.31  | 2235.49 | 192.31  | 2235.5  | 211.45  | 2235.84 |
| 216.93  | 2235.91 | 230.54  | 2235.99 | 233.05  | 2236.05 | 237.49  | 2236.17 | 260.09  | 2236.45 |
| 275.99  | 2236.72 | 305.67  | 2237.01 | 310.37  | 2237.44 | 310.58  | 2237.45 | 310.79  | 2237.44 |
| 311.03  | 2237.4  | 311.34  | 2237.33 | 311.9   | 2237.12 | 312.14  | 2237.01 | 312.97  | 2237    |
| 331.53  | 2237.31 | 333.55  | 2237.34 | 333.78  | 2237.35 | 333.97  | 2237.35 | 352.61  | 2237.63 |
| 352.95  | 2237.63 | 353.32  | 2237.62 | 353.66  | 2237.62 | 389.05  | 2238.14 | 389.45  | 2238.14 |
| 389.85  | 2238.15 | 424.86  | 2237.71 | 431.51  | 2237.73 | 432.84  | 2237.73 | 437.86  | 2237.66 |
| 439.69  | 2237.68 | 441.5   | 2238.1  | 442.15  | 2238.22 | 452.65  | 2238.37 | 453.11  | 2238.2  |
| 454.26  | 2237.82 | 458.01  | 2237.89 | 458.34  | 2237.9  | 475.72  | 2238.19 | 487.19  | 2238.3  |
| 497.41  | 2238.71 | 552.17  | 2238.47 | 577.13  | 2237.84 | 618.39  | 2236.88 | 626.95  | 2236.78 |
| 687.71  | 2235.88 | 690.64  | 2235.82 | 747.84  | 2235.35 | 751.54  | 2235.29 | 775.76  | 2235.06 |
| 788.62  | 2235.22 | 911.52  | 2237.17 | 926.1   | 2236.76 | 988.47  | 2235.2  | 990.31  | 2235.17 |
| 993.67  | 2235.13 | 1026.23 | 2234.83 | 1035.41 | 2234.56 | 1042.49 | 2234.37 | 1058.19 | 2234.4  |
| 1066.27 | 2234.27 | 1079.18 | 2234.15 | 1083.28 | 2234.78 | 1094    | 2235.33 | 1099.48 | 2235.31 |
| 1114.67 | 2235.43 | 1117.55 | 2235.43 | 1123.41 | 2235.55 | 1125.53 | 2235.6  | 1147.25 | 2235.62 |
| 1148.72 | 2235.65 | 1150.45 | 2235.67 | 1155.56 | 2235.67 | 1175.68 | 2235.75 | 1197    | 2235.93 |
| 1217.18 | 2236.23 | 1232.89 | 2236.18 | 1246.44 | 2236.25 | 1254.63 | 2236.17 | 1272.18 | 2236.73 |
| 1272.6  | 2236.73 | 1273.56 | 2236.72 | 1277.47 | 2236.55 | 1283.89 | 2236.61 | 1299.82 | 2236.47 |
| 1323.74 | 2236.92 | 1354.79 | 2237.41 | 1361.53 | 2237.47 | 1375.35 | 2238    | 1379.24 | 2238.07 |
| 1381.44 | 2237.99 | 1386.4  | 2238.04 | 1393.17 | 2237.9  | 1401.06 | 2237.9  | 1403.34 | 2238.02 |
| 1406.34 | 2238.05 | 1431.62 | 2238.37 | 1436.63 | 2238.44 | 1452.19 | 2239.15 | 1452.61 | 2239.15 |
| 1468.44 | 2239.2  | 1471.53 | 2239.24 | 1485.79 | 2239.3  | 1529    | 2239.67 | 1538.01 | 2239.77 |
| 1540.53 | 2239.79 | 1542.85 | 2239.82 | 1560.61 | 2240    | 1562.36 | 2240.02 | 1583.4  | 2240.21 |
| 1584.9  | 2240.23 | 1596.92 | 2240.35 | 1601.27 | 2240.42 | 1601.57 | 2240.43 | 1618.31 | 2240.69 |
| 1619.9  | 2240.71 | 1653.04 | 2240.88 | 1670.26 | 2241.06 | 1675.85 | 2241.14 | 1718.28 | 2241.6  |
| 1719.77 | 2241.62 | 1730.43 | 2241.65 | 1753.72 | 2241.83 | 1761.78 | 2241.87 | 1785.38 | 2241.85 |
| 1793.05 | 2241.8  | 1797.44 | 2241.72 | 1801.22 | 2241.66 | 1806.54 | 2241.67 | 1810.6  | 2241.65 |
| 1820.74 | 2241.84 | 1825.59 | 2241.85 | 1844.48 | 2242.36 | 1877.58 | 2242.85 | 1887.66 | 2243.06 |
| 1895.14 | 2243.34 | 1896.5  | 2243.36 | 1897.45 | 2243.36 | 1904.69 | 2243.42 | 1905.73 | 2243.43 |
| 1912.65 | 2243.52 | 1974.75 | 2243.97 | 1976.75 | 2243.81 | 1987.79 | 2243.74 | 1999.84 | 2243.56 |

|         |         |         |         |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 2011.27 | 2243.54 | 2014.62 | 2243.55 | 2043.88 | 2244.16 | 2054.08 | 2244.28 | 2066.28 | 2244.52 |
| 2067.2  | 2244.52 | 2067.26 | 2244.53 | 2067.59 | 2244.53 | 2141.7  | 2245.23 | 2150.45 | 2245.24 |
| 2159.67 | 2245.38 | 2175.53 | 2245.57 | 2177.21 | 2245.62 | 2200.05 | 2246.1  | 2203.05 | 2246.17 |
| 2232.38 | 2246.92 | 2239.71 | 2246.52 | 2241.88 | 2246.42 | 2264.31 | 2246.54 | 2299    | 2246.88 |
| 2300.23 | 2247.02 | 2302.45 | 2247.33 | 2316.08 | 2247.62 | 2323.34 | 2247.94 | 2332.76 | 2248.24 |
| 2354.1  | 2248.68 | 2360.16 | 2248.94 | 2375.68 | 2249.13 | 2388.84 | 2249.32 | 2441.21 | 2249.82 |
| 2441.29 | 2249.82 | 2451.12 | 2249.42 | 2455.15 | 2249.42 |         |         |         |         |

|                    |       |        |       |         |       |
|--------------------|-------|--------|-------|---------|-------|
| Manning's n Values |       |        |       | num=    | 3     |
| Sta                | n Val | Sta    | n Val | Sta     | n Val |
| 0                  | .02   | 432.84 | .03   | 1035.41 | .02   |

|                  |         |         |           |        |         |       |       |        |        |
|------------------|---------|---------|-----------|--------|---------|-------|-------|--------|--------|
| Bank Sta:        | Left    | Right   | Lengths:  | Left   | Channel | Right | Coeff | Contr. | Expan. |
|                  | 432.84  | 1035.41 |           | 569.67 | 569.7   | 569.7 |       | .1     | .3     |
| Ineffective Flow |         |         | num=      | 3      |         |       |       |        |        |
| Sta L            | Sta R   | Elev    | Permanent |        |         |       |       |        |        |
| 0                | 383     | 2242.45 | T         |        |         |       |       |        |        |
| 819              | 973     | 2242    | T         |        |         |       |       |        |        |
| 1074             | 2455.15 | 2242    | T         |        |         |       |       |        |        |

## CROSS SECTION

RIVER: Rancho  
 REACH: lower RS: 13841.4

## INPUT

## Description:

|         |           |         |         |         |         |         |         |         |         |
|---------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|
| Station | Elevation | Data    | num=    | 222     |         |         |         |         |         |
| Sta     | Elev      | Sta     | Elev    | Sta     | Elev    | Sta     | Elev    | Sta     | Elev    |
| 0       | 2220.77   | 7.63    | 2220.8  | 8.94    | 2220.81 | 10.73   | 2220.82 | 69.45   | 2221.33 |
| 79.57   | 2221.57   | 87.83   | 2221.68 | 102.63  | 2221.9  | 112.2   | 2221.84 | 112.83  | 2221.72 |
| 113.46  | 2221.69   | 115.99  | 2221.56 | 119.44  | 2221.37 | 121.49  | 2221.29 | 125.32  | 2221.66 |
| 129.09  | 2221.92   | 139.87  | 2222.74 | 144.68  | 2222.83 | 154.82  | 2223.72 | 154.98  | 2223.73 |
| 165.75  | 2223.83   | 169.38  | 2223.98 | 173.85  | 2224.2  | 176.04  | 2224.26 | 179.48  | 2224.49 |
| 182.19  | 2224.55   | 187.49  | 2224.5  | 191.18  | 2224.63 | 196.41  | 2224.55 | 201.16  | 2224.62 |
| 211.54  | 2224.73   | 212.46  | 2224.75 | 215.93  | 2224.81 | 230.44  | 2224.42 | 241.46  | 2224.05 |
| 242.13  | 2224.04   | 252.37  | 2224.04 | 270.82  | 2224.21 | 298.76  | 2225.05 | 299.86  | 2225.07 |
| 300.39  | 2225.11   | 300.89  | 2225.33 | 301.77  | 2225.78 | 307.24  | 2228.56 | 311.94  | 2228.71 |
| 316.79  | 2228.81   | 317.88  | 2228.83 | 333.57  | 2229.14 | 354.75  | 2229.5  | 362.54  | 2229.57 |
| 377.09  | 2229.66   | 413.51  | 2229.01 | 419.27  | 2229.07 | 419.71  | 2229.07 | 429.59  | 2229.12 |
| 430.12  | 2229.13   | 431.62  | 2228.91 | 440.51  | 2227.56 | 443.36  | 2227.62 | 448.02  | 2227.86 |
| 452.5   | 2228.01   | 466.78  | 2229.31 | 468.47  | 2229.57 | 472.4   | 2229.78 | 475.75  | 2229.28 |
| 477.11  | 2229.33   | 478.89  | 2229.4  | 480.8   | 2229.45 | 482.35  | 2229.51 | 484.59  | 2229.57 |
| 485.38  | 2229.59   | 487.99  | 2229.66 | 489.22  | 2229.69 | 493.85  | 2229.91 | 494.91  | 2229.91 |
| 500.39  | 2229.86   | 502.47  | 2229.81 | 503.95  | 2229.77 | 506.33  | 2229.71 | 506.96  | 2229.69 |
| 509.63  | 2229.62   | 509.77  | 2229.61 | 512.15  | 2229.68 | 512.57  | 2229.71 | 517.1   | 2229.86 |
| 518.76  | 2229.91   | 525.81  | 2230.14 | 531.88  | 2230.32 | 533.41  | 2230.37 | 540.79  | 2230.57 |
| 541.25  | 2230.59   | 541.64  | 2230.6  | 546.95  | 2230.88 | 547.22  | 2230.89 | 550.32  | 2231.05 |
| 552.83  | 2231.13   | 566.72  | 2231.04 | 577.2   | 2230.96 | 584.04  | 2230.88 | 602.7   | 2230.54 |
| 603.14  | 2230.53   | 603.48  | 2230.53 | 606.48  | 2230.47 | 620.19  | 2230.47 | 636.55  | 2230.59 |
| 651.24  | 2230.65   | 675.76  | 2230.81 | 694.92  | 2230.99 | 728.42  | 2231.07 | 731.06  | 2231.09 |
| 737.75  | 2231.13   | 742.2   | 2231.12 | 759.51  | 2231.18 | 772.23  | 2231.58 | 774.14  | 2231.66 |
| 830.49  | 2232.26   | 886.58  | 2232.2  | 908.19  | 2232.01 | 920.26  | 2231.98 | 925.8   | 2231.94 |
| 935.97  | 2231.85   | 976.13  | 2231.27 | 985.29  | 2231.12 | 989.4   | 2231.03 | 992.41  | 2231.02 |
| 998.43  | 2230.95   | 1016.35 | 2230.89 | 1049.55 | 2230.44 | 1057.39 | 2230.28 | 1059.63 | 2230.23 |
| 1060.14 | 2230.24   | 1063.53 | 2230.2  | 1064.19 | 2230.19 | 1064.47 | 2230.19 | 1106.4  | 2230.55 |
| 1120.79 | 2230.41   | 1141.46 | 2230.53 | 1151.29 | 2230.7  | 1195.01 | 2230.43 | 1199.09 | 2230.41 |
| 1200.6  | 2230.38   | 1227.77 | 2229.91 | 1243.79 | 2230.12 | 1257.85 | 2230.44 | 1287.85 | 2231.84 |
| 1294.96 | 2232.1    | 1298.84 | 2232.16 | 1336.82 | 2232.49 | 1338.78 | 2232.47 | 1341.21 | 2232.47 |
| 1444    | 2232.24   | 1464.67 | 2232.28 | 1465.26 | 2232.47 | 1471.57 | 2232.59 | 1488.6  | 2233.3  |
| 1504.28 | 2233.78   | 1545.97 | 2233.05 | 1576.04 | 2232.41 | 1589.16 | 2231.86 | 1602.25 | 2231.23 |
| 1609.78 | 2231.59   | 1611.76 | 2231.71 | 1616.84 | 2231.62 | 1623.29 | 2231.44 | 1638.77 | 2231.45 |
| 1669.9  | 2231.89   | 1670.47 | 2231.91 | 1671.23 | 2231.95 | 1672.48 | 2231.98 | 1694.31 | 2232.53 |
| 1720.83 | 2232.63   | 1723.39 | 2232.61 | 1724.1  | 2232.6  | 1724.86 | 2232.6  | 1739.07 | 2232.52 |
| 1782.9  | 2233.12   | 1794.33 | 2233.2  | 1863.09 | 2234.29 | 1878.16 | 2234.42 | 1908.16 | 2235    |
| 1922.49 | 2235.19   | 1977.11 | 2236.08 | 1999.9  | 2236.41 | 2045.27 | 2236.76 | 2060.29 | 2237.14 |
| 2063.5  | 2237.17   | 2074.23 | 2237.24 | 2093.86 | 2237.29 | 2096.48 | 2237.29 | 2096.66 | 2237.36 |
| 2097.28 | 2237.54   | 2098.93 | 2237.49 | 2111.04 | 2236.99 | 2117.84 | 2236.78 | 2124.17 | 2236.54 |
| 2127.13 | 2236.47   | 2129.66 | 2236.4  | 2130.05 | 2236.14 | 2130.31 | 2235.97 | 2135.68 | 2236.08 |
| 2197.58 | 2237.47   | 2202.5  | 2237.61 | 2204.17 | 2237.63 | 2207.14 | 2237.85 | 2216.72 | 2238.6  |
| 2223.65 | 2238.96   | 2232.41 | 2239.59 | 2241.23 | 2239.68 | 2254.56 | 2240.03 | 2262.67 | 2239.93 |
| 2264.47 | 2239.93   | 2266.16 | 2239.88 | 2280.26 | 2239.88 | 2316.17 | 2240.54 | 2325.05 | 2240.84 |
| 2341.51 | 2241.49   | 2342.46 | 2241.41 | 2346.73 | 2241.13 | 2351.76 | 2241.08 | 2352.01 | 2241.09 |
| 2352.31 | 2241.1    | 2353.42 | 2241.11 |         |         |         |         |         |         |

|                    |       |        |       |        |       |
|--------------------|-------|--------|-------|--------|-------|
| Manning's n Values |       |        |       | num=   | 3     |
| Sta                | n Val | Sta    | n Val | Sta    | n Val |
| 0                  | .02   | 431.62 | .03   | 830.49 | .04   |

|                  |         |          |           |       |         |       |       |        |        |
|------------------|---------|----------|-----------|-------|---------|-------|-------|--------|--------|
| Bank Sta:        | Left    | Right    | Lengths:  | Left  | Channel | Right | Coeff | Contr. | Expan. |
|                  | 431.62  | 830.49   |           | 86.42 | 86.42   | 86.42 |       | .1     | .3     |
| Ineffective Flow |         |          | num=      | 4     |         |       |       |        |        |
| Sta L            | Sta R   | Elev     | Permanent |       |         |       |       |        |        |
| 0                | 377     | 2232.73  | F         |       |         |       |       |        |        |
| 797.32           | 1041.91 | 2235     | F         |       |         |       |       |        |        |
| 1340.32          | 2137.93 | 2236.129 | F         |       |         |       |       |        |        |
| 2188.32          | 2346.07 | 2241.172 | F         |       |         |       |       |        |        |

## CROSS SECTION

RIVER: Rancho

REACH: lower

RS: 13754.98

## INPUT

Description:

| Station | Elevation | Data    | num=    | 167     |         |         |         |         |         |
|---------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|
| Sta     | Elev      | Sta     | Elev    | Sta     | Elev    | Sta     | Elev    | Sta     | Elev    |
| 0       | 2219.45   | 22.42   | 2219.6  | 35.94   | 2219.77 | 58      | 2219.87 | 63.76   | 2219.59 |
| 80.54   | 2219.93   | 81.31   | 2219.95 | 81.43   | 2219.95 | 104.38  | 2220.65 | 114.05  | 2220.98 |
| 117.2   | 2221.06   | 133.39  | 2221.45 | 143.81  | 2221.35 | 150.86  | 2221.33 | 153.59  | 2221.25 |
| 155.52  | 2221.11   | 161.17  | 2220.72 | 165.98  | 2220.4  | 175.37  | 2221.12 | 179.57  | 2221.32 |
| 180.98  | 2221.44   | 181.89  | 2221.48 | 185.34  | 2221.56 | 190.59  | 2221.15 | 196.23  | 2220.55 |
| 196.8   | 2220.57   | 200.79  | 2220.79 | 208.55  | 2220.92 | 230.5   | 2221.15 | 235.29  | 2221.27 |
| 252.2   | 2221.6    | 258.36  | 2221.74 | 273.67  | 2222.68 | 289.28  | 2223.25 | 295.55  | 2223.89 |
| 297.08  | 2224.05   | 297.97  | 2224.55 | 302.95  | 2227.28 | 311.44  | 2227.72 | 313.34  | 2227.75 |
| 349.14  | 2228.23   | 370.42  | 2228.41 | 417.94  | 2227.97 | 418.15  | 2227.97 | 418.3   | 2227.98 |
| 421.87  | 2228.06   | 426.13  | 2228.17 | 433.05  | 2227.99 | 433.36  | 2227.98 | 433.59  | 2227.9  |
| 437.73  | 2226.55   | 444.96  | 2224.18 | 446.44  | 2224.08 | 458.08  | 2223.34 | 466.38  | 2224.77 |
| 473.22  | 2225.93   | 482.6   | 2226.64 | 493.22  | 2227.65 | 507.22  | 2227.47 | 510.48  | 2227.47 |
| 529.72  | 2227.39   | 557.84  | 2227.41 | 562.04  | 2227.46 | 567.54  | 2227.59 | 584.95  | 2228.13 |
| 593.72  | 2228.23   | 615.24  | 2228.79 | 622.16  | 2228.87 | 648.01  | 2229.02 | 648.34  | 2229.02 |
| 648.86  | 2229.03   | 684.49  | 2229.43 | 691.46  | 2229.47 | 703.8   | 2229.49 | 716.69  | 2229.41 |
| 724.14  | 2229.42   | 729.53  | 2229.44 | 738.48  | 2229.51 | 747.02  | 2229.52 | 757.33  | 2229.63 |
| 776.78  | 2229.58   | 805     | 2229.16 | 806.89  | 2229.15 | 825.43  | 2228.93 | 841.5   | 2229.25 |
| 847.53  | 2229.33   | 854.66  | 2229.6  | 857.09  | 2229.63 | 876.28  | 2229.32 | 877.61  | 2229.33 |
| 878.53  | 2229.32   | 913.93  | 2229.23 | 917.86  | 2229.35 | 921.27  | 2229.41 | 931.67  | 2229.45 |
| 934.57  | 2229.43   | 947.07  | 2229.55 | 953.33  | 2229.65 | 961.96  | 2229.84 | 964.86  | 2229.75 |
| 972.59  | 2229.75   | 977.12  | 2229.72 | 986.02  | 2229.93 | 989.61  | 2230.08 | 992.18  | 2230.08 |
| 996.95  | 2230.26   | 999.33  | 2230.37 | 1000.36 | 2230.42 | 1007.72 | 2230.29 | 1021.77 | 2230.23 |
| 1042.18 | 2229.97   | 1044.21 | 2230.06 | 1046.5  | 2230.2  | 1050.19 | 2229.55 | 1052.42 | 2229.22 |
| 1056.56 | 2229.14   | 1063.87 | 2229.19 | 1086.19 | 2228.76 | 1086.46 | 2228.76 | 1106.74 | 2228.22 |
| 1110.43 | 2228.37   | 1136.31 | 2229.32 | 1147.3  | 2229.64 | 1165.14 | 2229.92 | 1172.21 | 2229.99 |
| 1180.99 | 2229.84   | 1210.83 | 2229.48 | 1228.69 | 2229.37 | 1236.57 | 2229.49 | 1252.53 | 2229.85 |
| 1269.61 | 2230.37   | 1290.53 | 2231.09 | 1330.52 | 2231.65 | 1332.45 | 2231.72 | 1385.98 | 2231.87 |
| 1459.52 | 2231.87   | 1468.08 | 2232.01 | 1481.09 | 2232.2  | 1499.73 | 2232.37 | 1528.44 | 2232.04 |
| 1548.24 | 2231.92   | 1567.53 | 2231.99 | 1584.94 | 2232.01 | 1619.74 | 2231.59 | 1620.89 | 2231.57 |
| 1622.87 | 2231.55   | 1643.84 | 2231.49 | 1651.66 | 2230.68 | 1652.54 | 2230.59 | 1656.93 | 2230.79 |
| 1665.06 | 2231.11   | 1671.12 | 2231.22 | 1673.32 | 2231.24 | 1673.7  | 2231.24 | 1675.05 | 2231.28 |
| 1678.34 | 2231.27   | 1696.08 | 2231.41 | 1703.05 | 2231.44 | 1708.77 | 2231.48 | 1721.66 | 2231.54 |
| 1758.49 | 2231.82   | 1764.13 | 2231.81 | 1775.79 | 2231.98 | 1789.85 | 2232.07 | 1800.95 | 2232.53 |
| 1810.72 | 2233.1    | 1825.91 | 2233.33 |         |         |         |         |         |         |

| Manning's n | Values | num=   | 3     |
|-------------|--------|--------|-------|
| Sta         | n Val  | Sta    | n Val |
| 0           | .02    | 433.59 | .03   |
|             |        | 493.22 | .04   |

| Bank Sta:        | Left    | Right    | Lengths:  | Left  | Channel | Right  | Coeff | Contr. | Expan. |
|------------------|---------|----------|-----------|-------|---------|--------|-------|--------|--------|
|                  | 433.59  | 493.22   |           | 220.1 | 221.27  | 222.31 |       | .1     | .3     |
| Ineffective Flow | num=    | 3        |           |       |         |        |       |        |        |
| Sta L            | Sta R   | Elev     | Permanent |       |         |        |       |        |        |
| 0                | 313     | 2230     | F         |       |         |        |       |        |        |
| 775.61           | 1046.14 | 2230.181 | F         |       |         |        |       |        |        |
| 1332.47          | 1825.91 | 2233.329 | F         |       |         |        |       |        |        |

## CROSS SECTION

RIVER: Rancho

REACH: lower

RS: 13533.66

## INPUT

Description:

| Station | Elevation | Data    | num=    | 170     |         |         |         |         |         |
|---------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|
| Sta     | Elev      | Sta     | Elev    | Sta     | Elev    | Sta     | Elev    | Sta     | Elev    |
| 0       | 2220.01   | 3.23    | 2220.1  | 13.07   | 2220.3  | 30.11   | 2220.59 | 32.82   | 2220.63 |
| 34.9    | 2220.68   | 46.73   | 2220.5  | 47.29   | 2220.5  | 48.5    | 2220.59 | 63.2    | 2221.8  |
| 66.1    | 2223.34   | 67.98   | 2224.41 | 80.24   | 2224.89 | 82.3    | 2224.94 | 117.25  | 2225.73 |
| 126.19  | 2225.77   | 127.23  | 2225.76 | 163.87  | 2225.45 | 187.76  | 2225.18 | 192.07  | 2225.48 |
| 194.71  | 2225.6    | 195.63  | 2225.64 | 196.43  | 2222.7  | 196.89  | 2221.14 | 197.27  | 2221.13 |
| 222.21  | 2221.12   | 223.5   | 2222.56 | 225.8   | 2224.98 | 245.43  | 2225.14 | 247.32  | 2225.13 |
| 250.36  | 2225.13   | 256.61  | 2225.32 | 268.29  | 2225.38 | 298.56  | 2225.27 | 304.5   | 2225.4  |
| 317.99  | 2225.8    | 332.12  | 2226.1  | 348.42  | 2226.51 | 356.72  | 2226.74 | 368.3   | 2227.01 |
| 380.53  | 2227.19   | 389.98  | 2227.39 | 402.98  | 2227.77 | 419.23  | 2228.14 | 442.82  | 2228.83 |
| 478.97  | 2229.28   | 502.48  | 2229.46 | 511.01  | 2229.43 | 544.05  | 2229.26 | 555.62  | 2229.13 |
| 587.27  | 2229.28   | 598.32  | 2229.1  | 612.97  | 2229.23 | 625.45  | 2229.03 | 629.47  | 2228.95 |
| 634.07  | 2228.92   | 647.74  | 2228.87 | 668.76  | 2228.49 | 686.49  | 2228.21 | 697.14  | 2227.84 |
| 707.17  | 2227.71   | 716.25  | 2227.77 | 721.88  | 2227.86 | 728     | 2227.81 | 730.98  | 2227.82 |
| 739.03  | 2227.94   | 742.17  | 2227.82 | 755.9   | 2227.52 | 767.93  | 2227.43 | 772.27  | 2227.43 |
| 776.53  | 2227.47   | 779.28  | 2227.6  | 785.01  | 2228.44 | 789.35  | 2228.7  | 793.49  | 2229.01 |
| 802.63  | 2228.22   | 811.79  | 2227.61 | 820.66  | 2228.51 | 823.97  | 2228.8  | 839.29  | 2226.74 |
| 859.97  | 2226.95   | 871.8   | 2227.11 | 874.75  | 2227.18 | 879.92  | 2227.51 | 892.03  | 2227.95 |
| 892.28  | 2227.96   | 892.51  | 2227.97 | 903.36  | 2228.15 | 916.24  | 2228.19 | 939.95  | 2228.19 |
| 950.08  | 2228.16   | 953.84  | 2228.17 | 968.14  | 2228.11 | 990.08  | 2228.12 | 991.67  | 2228.1  |
| 993.74  | 2228.11   | 1016.58 | 2228.13 | 1034.92 | 2228.57 | 1035.53 | 2228.58 | 1053.45 | 2228.99 |
| 1085.06 | 2229.5    | 1102.27 | 2230.22 | 1113.11 | 2230.42 | 1133.78 | 2230.25 | 1146.16 | 2230.32 |
| 1196.72 | 2230.7    | 1202.05 | 2230.66 | 1203.35 | 2230.66 | 1210.47 | 2230.77 | 1246.87 | 2231.27 |

|         |         |         |         |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 1269.02 | 2231.46 | 1279.42 | 2231.48 | 1305.59 | 2230.94 | 1306.44 | 2230.89 | 1307.01 | 2230.89 |
| 1361.61 | 2230.68 | 1364.4  | 2230.64 | 1371    | 2230.67 | 1419.85 | 2230.81 | 1434.29 | 2230.68 |
| 1444.95 | 2230.71 | 1471.59 | 2230.68 | 1508.4  | 2230.4  | 1529.74 | 2230.69 | 1537.96 | 2230.73 |
| 1543.81 | 2230.92 | 1550.36 | 2231.2  | 1558.27 | 2231.39 | 1568.9  | 2231.69 | 1581.02 | 2231.85 |
| 1636.98 | 2232.32 | 1639.27 | 2232.33 | 1642.61 | 2232.36 | 1688.07 | 2232.87 | 1691.1  | 2232.91 |
| 1691.38 | 2232.92 | 1726.15 | 2233.25 | 1727.59 | 2233.25 | 1729.23 | 2233.27 | 1730.66 | 2233.28 |
| 1783.79 | 2233.55 | 1786.95 | 2233.62 | 1791.04 | 2233.69 | 1811.4  | 2234.17 | 1826.95 | 2234.18 |
| 1833.65 | 2234.34 | 1836.29 | 2234.46 | 1857.48 | 2234.65 | 1860.16 | 2234.7  | 1887.83 | 2234.86 |
| 1893.46 | 2234.99 | 1927.57 | 2235.31 | 1932.93 | 2235.33 | 1954.44 | 2235.63 | 1958.93 | 2235.67 |
| 1977.98 | 2235.77 | 1997.94 | 2236.03 | 2016.38 | 2236.2  | 2029.45 | 2235.71 | 2033.53 | 2235.54 |
| 2034.4  | 2235.74 | 2034.71 | 2235.82 | 2039.43 | 2235.8  | 2041.14 | 2235.79 | 2041.4  | 2235.76 |
| 2042.71 | 2235.6  | 2109.14 | 2236.44 | 2113.86 | 2236.81 | 2116.1  | 2236.96 | 2147.73 | 2236.96 |

Manning's n Values num= 3

| Sta | n Val | Sta    | n Val | Sta    | n Val |
|-----|-------|--------|-------|--------|-------|
| 0   | .02   | 195.63 | .03   | 245.43 | .04   |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

|        |        |        |        |        |    |    |
|--------|--------|--------|--------|--------|----|----|
| 195.63 | 245.43 | 156.67 | 156.67 | 156.67 | .1 | .3 |
|--------|--------|--------|--------|--------|----|----|

Ineffective Flow num= 4

| Sta L   | Sta R   | Elev     | Permanent |
|---------|---------|----------|-----------|
| 0       | 115     | 2229.17  | F         |
| 496.78  | 840.47  | 2229.418 | F         |
| 1100.53 | 2051    | 2235.7   | F         |
| 2103.76 | 2116.86 | 2236.368 | F         |

## CULVERT

RIVER: Rancho  
REACH: lower RS: 13400

## INPUT

## Description:

Distance from Upstream XS = 15  
Deck/Roadway Width = 100  
Weir Coefficient = 2.6

## Upstream Deck/Roadway Coordinates

num= 2

| Sta    | Hi Cord | Lo Cord | Sta   | Hi Cord | Lo Cord |
|--------|---------|---------|-------|---------|---------|
| 195.63 | 2225.64 | 2221    | 225.8 | 2224.98 | 2221    |

## Upstream Bridge Cross Section Data

Station Elevation Data num= 170

| Sta     | Elev    | Sta     | Elev    | Sta     | Elev    | Sta     | Elev    | Sta     | Elev    |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0       | 2220.01 | 3.23    | 2220.1  | 13.07   | 2220.3  | 30.11   | 2220.59 | 32.82   | 2220.63 |
| 34.9    | 2220.68 | 46.73   | 2220.5  | 47.29   | 2220.5  | 48.5    | 2220.59 | 63.2    | 2221.8  |
| 66.1    | 2223.34 | 67.98   | 2224.41 | 80.24   | 2224.89 | 82.3    | 2224.94 | 117.25  | 2225.73 |
| 126.19  | 2225.77 | 127.23  | 2225.76 | 163.87  | 2225.45 | 187.76  | 2225.18 | 192.07  | 2225.48 |
| 194.71  | 2225.6  | 195.63  | 2225.64 | 196.43  | 2222.7  | 196.89  | 2221.14 | 197.27  | 2221.13 |
| 222.21  | 2221.12 | 223.5   | 2222.56 | 225.8   | 2224.98 | 245.43  | 2225.14 | 247.32  | 2225.13 |
| 250.36  | 2225.13 | 256.61  | 2225.32 | 268.29  | 2225.38 | 298.56  | 2225.27 | 304.5   | 2225.4  |
| 317.99  | 2225.8  | 332.12  | 2226.1  | 348.42  | 2226.51 | 356.72  | 2226.74 | 368.3   | 2227.01 |
| 380.53  | 2227.19 | 389.98  | 2227.39 | 402.98  | 2227.77 | 419.23  | 2228.14 | 442.82  | 2228.83 |
| 478.97  | 2229.28 | 502.48  | 2229.46 | 511.01  | 2229.43 | 544.05  | 2229.26 | 555.62  | 2229.13 |
| 587.27  | 2229.28 | 598.32  | 2229.1  | 612.97  | 2229.23 | 625.45  | 2229.03 | 629.47  | 2228.95 |
| 634.07  | 2228.92 | 647.74  | 2228.87 | 668.76  | 2228.49 | 686.49  | 2228.21 | 697.14  | 2227.84 |
| 707.17  | 2227.71 | 716.25  | 2227.77 | 721.88  | 2227.86 | 728     | 2227.81 | 730.98  | 2227.82 |
| 739.03  | 2227.94 | 742.17  | 2227.82 | 755.9   | 2227.52 | 767.93  | 2227.43 | 772.27  | 2227.43 |
| 776.53  | 2227.47 | 779.28  | 2227.6  | 785.01  | 2228.44 | 789.35  | 2228.7  | 793.49  | 2229.01 |
| 802.63  | 2228.22 | 811.79  | 2227.61 | 820.66  | 2228.51 | 823.97  | 2228.8  | 839.29  | 2226.74 |
| 859.97  | 2226.95 | 871.8   | 2227.11 | 874.75  | 2227.18 | 879.92  | 2227.51 | 892.03  | 2227.95 |
| 892.28  | 2227.96 | 892.51  | 2227.97 | 903.36  | 2228.15 | 916.24  | 2228.19 | 939.95  | 2228.19 |
| 950.08  | 2228.16 | 953.84  | 2228.17 | 968.14  | 2228.11 | 990.08  | 2228.12 | 991.67  | 2228.1  |
| 993.74  | 2228.11 | 1016.58 | 2228.13 | 1034.92 | 2228.57 | 1035.53 | 2228.58 | 1053.45 | 2228.99 |
| 1085.06 | 2229.5  | 1102.27 | 2230.22 | 1113.11 | 2230.42 | 1133.78 | 2230.25 | 1146.16 | 2230.32 |
| 1196.72 | 2230.7  | 1202.05 | 2230.66 | 1203.35 | 2230.66 | 1210.47 | 2230.77 | 1246.87 | 2231.27 |
| 1269.02 | 2231.46 | 1279.42 | 2231.48 | 1305.59 | 2230.94 | 1306.44 | 2230.89 | 1307.01 | 2230.89 |
| 1361.61 | 2230.68 | 1364.4  | 2230.64 | 1371    | 2230.67 | 1419.85 | 2230.81 | 1434.29 | 2230.68 |
| 1444.95 | 2230.71 | 1471.59 | 2230.68 | 1508.4  | 2230.4  | 1529.74 | 2230.69 | 1537.96 | 2230.73 |
| 1543.81 | 2230.92 | 1550.36 | 2231.2  | 1558.27 | 2231.39 | 1568.9  | 2231.69 | 1581.02 | 2231.85 |
| 1636.98 | 2232.32 | 1639.27 | 2232.33 | 1642.61 | 2232.36 | 1688.07 | 2232.87 | 1691.1  | 2232.91 |
| 1691.38 | 2232.92 | 1726.15 | 2233.25 | 1727.59 | 2233.25 | 1729.23 | 2233.27 | 1730.66 | 2233.28 |
| 1783.79 | 2233.55 | 1786.95 | 2233.62 | 1791.04 | 2233.69 | 1811.4  | 2234.17 | 1826.95 | 2234.18 |
| 1833.65 | 2234.34 | 1836.29 | 2234.46 | 1857.48 | 2234.65 | 1860.16 | 2234.7  | 1887.83 | 2234.86 |
| 1893.46 | 2234.99 | 1927.57 | 2235.31 | 1932.93 | 2235.33 | 1954.44 | 2235.63 | 1958.93 | 2235.67 |
| 1977.98 | 2235.77 | 1997.94 | 2236.03 | 2016.38 | 2236.2  | 2029.45 | 2235.71 | 2033.53 | 2235.54 |
| 2034.4  | 2235.74 | 2034.71 | 2235.82 | 2039.43 | 2235.8  | 2041.14 | 2235.79 | 2041.4  | 2235.76 |
| 2042.71 | 2235.6  | 2109.14 | 2236.44 | 2113.86 | 2236.81 | 2116.1  | 2236.96 | 2147.73 | 2236.96 |

Manning's n Values num= 3

| Sta | n Val | Sta    | n Val | Sta    | n Val |
|-----|-------|--------|-------|--------|-------|
| 0   | .02   | 195.63 | .03   | 245.43 | .04   |

Bank Sta: Left Right Coeff Contr. Expan.

|        |        |    |    |
|--------|--------|----|----|
| 195.63 | 245.43 | .1 | .3 |
|--------|--------|----|----|

Ineffective Flow num= 4

| Sta L | Sta R | Elev    | Permanent |
|-------|-------|---------|-----------|
| 0     | 115   | 2229.17 | F         |

496.78 840.472229.418 F  
 1100.53 2051 2235.7 F  
 2103.76 2116.862236.368 F

## Downstream Deck/Roadway Coordinates

num= 4  

| Sta    | Hi | Cord | Lo | Cord | Sta    | Hi | Cord | Lo | Cord | Sta | Hi | Cord | Lo | Cord |
|--------|----|------|----|------|--------|----|------|----|------|-----|----|------|----|------|
| 232.31 |    | 2223 |    | 2218 | 265.09 |    | 2224 |    | 2218 | 300 |    | 2224 |    | 2218 |
| 500    |    | 2222 |    | 2218 |        |    |      |    |      |     |    |      |    |      |

## Downstream Bridge Cross Section Data

Station Elevation Data num= 118  

| Sta    | Elev    | Sta    | Elev    | Sta     | Elev    | Sta    | Elev    | Sta    | Elev    |
|--------|---------|--------|---------|---------|---------|--------|---------|--------|---------|
| 0      | 2217.38 | 25.72  | 2217.02 | 47.7    | 2216.68 | 64.08  | 2216.6  | 72.44  | 2216.68 |
| 78.59  | 2216.96 | 93.35  | 2219    | 98.77   | 2219.76 | 101.04 | 2220.84 | 105.47 | 2222.99 |
| 110.64 | 2223.12 | 117.95 | 2223.39 | 118.52  | 2223.39 | 137.46 | 2223.65 | 165.51 | 2224.05 |
| 175.83 | 2223.92 | 176.73 | 2223.91 | 179.16  | 2223.86 | 195.71 | 2223.57 | 232.24 | 2222.94 |
| 232.31 | 2222.94 | 238.07 | 2220.77 | 241.32  | 2219.1  | 241.6  | 2218.91 | 241.87 | 2218.32 |
| 250.47 | 2218.39 | 252.52 | 2218.4  | 252.68  | 2218.56 | 253.44 | 2218.91 | 260.28 | 2220.4  |
| 265.09 | 2221.4  | 267.32 | 2221.06 | 268.74  | 2221.19 | 270.63 | 2221.21 | 274.36 | 2221.12 |
| 275.79 | 2221.06 | 281.04 | 2221.1  | 287.22  | 2221.08 | 293.15 | 2221.06 | 296.93 | 2221.08 |
| 304.08 | 2221    | 309.68 | 2220.95 | 313.69  | 2220.91 | 321.64 | 2221.27 | 328.84 | 2221.36 |
| 340.2  | 2220.4  | 343.47 | 2220.12 | 345.63  | 2220.11 | 371.65 | 2219.84 | 376.24 | 2219.86 |
| 385.83 | 2219.9  | 419.92 | 2220.13 | 424.31  | 2220.15 | 426.75 | 2220.19 | 429.76 | 2220.26 |
| 443.79 | 2220.8  | 449.72 | 2221.03 | 452.4   | 2221.11 | 473.15 | 2221.68 | 489.33 | 2221.85 |
| 503.61 | 2222.49 | 512.04 | 2222.82 | 525.62  | 2223.17 | 539.99 | 2223.12 | 563    | 2223.24 |
| 582.64 | 2223.51 | 587.24 | 2223.47 | 590.51  | 2223.44 | 595.58 | 2223.43 | 639.45 | 2223.92 |
| 641.57 | 2223.93 | 643.58 | 2223.93 | 647.9   | 2223.94 | 659.32 | 2224.02 | 676.61 | 2223.94 |
| 679.55 | 2223.91 | 684.03 | 2223.79 | 695.97  | 2223.67 | 702.69 | 2223.61 | 703.89 | 2223.58 |
| 705.03 | 2223.57 | 714.78 | 2223.22 | 717.73  | 2223.12 | 741.49 | 2222.88 | 746.78 | 2222.8  |
| 759.68 | 2222.46 | 773.3  | 2222.26 | 792.88  | 2222.26 | 798.37 | 2222.31 | 802.82 | 2222.31 |
| 810.17 | 2222.64 | 815.61 | 2222.86 | 845.01  | 2223.08 | 845.82 | 2223.09 | 846.3  | 2223.1  |
| 857.41 | 2223.31 | 865.3  | 2223.32 | 869.52  | 2223.26 | 874.17 | 2223.13 | 891.06 | 2223.31 |
| 893.38 | 2223.23 | 894.34 | 2223.18 | 902.56  | 2222.8  | 903.21 | 2222.99 | 903.53 | 2223.08 |
| 904.62 | 2223.38 | 906.36 | 2223.87 | 906.87  | 2224.01 | 907.4  | 2224.39 | 909.64 | 2226.03 |
| 916.02 | 2225.99 | 926.54 | 2225.91 | 967.41  | 2225.71 | 978.37 | 2225.77 | 983.09 | 2226.81 |
| 983.29 | 2226.85 | 983.98 | 2226.83 | 1003.67 | 2226.56 |        |         |        |         |

Manning's n Values num= 3  

| Sta | n Val | Sta    | n Val | Sta    | n Val |
|-----|-------|--------|-------|--------|-------|
| 0   | .02   | 232.31 | .03   | 265.09 | .04   |

Bank Sta: Left Right Coeff Contr. Expan.  
 232.31 265.09 .1 .3  
 Ineffective Flow num= 2  

| Sta L  | Sta R  | Elev    | Permanent |
|--------|--------|---------|-----------|
| 0      | 118    | 2225    | F         |
| 502.17 | 897.39 | 2223.04 | F         |

Upstream Embankment side slope = 0 horiz. to 1.0 vertical  
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical  
 Maximum allowable submergence for weir flow = .95  
 Elevation at which weir flow begins =  
 Energy head used in spillway design =  
 Spillway height used in design =  
 Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name Shape Rise Span  
 Culvert #1 Box 3 15  
 FHWA Chart # 8 - flared wingwalls  
 FHWA Scale # 1 - Wingwall flared 30 to 75 deg.  
 Solution Criteria = Highest U.S. EG  

| Culvert | Upstrm Dist | Length | Top n | Bottom n | Depth Blocked | Entrance Loss Coef | Exit Loss Coef |
|---------|-------------|--------|-------|----------|---------------|--------------------|----------------|
| 15      | 100         | .012   | .012  | 0        | .2            | 1                  |                |

Upstream Elevation = 2221  
 Centerline Station = 210  
 Downstream Elevation = 2218.4  
 Centerline Station = 248

## CROSS SECTION

RIVER: Rancho  
 REACH: lower RS: 13376.99

## INPUT

## Description:

Station Elevation Data num= 118  

| Sta    | Elev    | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    |
|--------|---------|--------|---------|--------|---------|--------|---------|--------|---------|
| 0      | 2217.38 | 25.72  | 2217.02 | 47.7   | 2216.68 | 64.08  | 2216.6  | 72.44  | 2216.68 |
| 78.59  | 2216.96 | 93.35  | 2219    | 98.77  | 2219.76 | 101.04 | 2220.84 | 105.47 | 2222.99 |
| 110.64 | 2223.12 | 117.95 | 2223.39 | 118.52 | 2223.39 | 137.46 | 2223.65 | 165.51 | 2224.05 |
| 175.83 | 2223.92 | 176.73 | 2223.91 | 179.16 | 2223.86 | 195.71 | 2223.57 | 232.24 | 2222.94 |
| 232.31 | 2222.94 | 238.07 | 2220.77 | 241.32 | 2219.1  | 241.6  | 2218.91 | 241.87 | 2218.32 |
| 250.47 | 2218.39 | 252.52 | 2218.4  | 252.68 | 2218.56 | 253.44 | 2218.91 | 260.28 | 2220.4  |
| 265.09 | 2221.4  | 267.32 | 2221.06 | 268.74 | 2221.19 | 270.63 | 2221.21 | 274.36 | 2221.12 |
| 275.79 | 2221.06 | 281.04 | 2221.1  | 287.22 | 2221.08 | 293.15 | 2221.06 | 296.93 | 2221.08 |

|        |         |        |         |         |         |        |         |        |         |
|--------|---------|--------|---------|---------|---------|--------|---------|--------|---------|
| 304.08 | 2221    | 309.68 | 2220.95 | 313.69  | 2220.91 | 321.64 | 2221.27 | 328.84 | 2221.36 |
| 340.2  | 2220.4  | 343.47 | 2220.12 | 345.63  | 2220.11 | 371.65 | 2219.84 | 376.24 | 2219.86 |
| 385.83 | 2219.9  | 419.92 | 2220.13 | 424.31  | 2220.15 | 426.75 | 2220.19 | 429.76 | 2220.26 |
| 443.79 | 2220.8  | 449.72 | 2221.03 | 452.4   | 2221.11 | 473.15 | 2221.68 | 489.33 | 2221.85 |
| 503.61 | 2222.49 | 512.04 | 2222.82 | 525.62  | 2223.17 | 539.99 | 2223.12 | 563    | 2223.24 |
| 582.64 | 2223.51 | 587.24 | 2223.47 | 590.51  | 2223.44 | 595.58 | 2223.43 | 639.45 | 2223.92 |
| 641.57 | 2223.93 | 643.58 | 2223.93 | 647.9   | 2223.94 | 659.32 | 2224.02 | 676.61 | 2223.94 |
| 679.55 | 2223.91 | 684.03 | 2223.79 | 695.97  | 2223.67 | 702.69 | 2223.61 | 703.89 | 2223.58 |
| 705.03 | 2223.57 | 714.78 | 2223.22 | 717.73  | 2223.12 | 741.49 | 2222.88 | 746.78 | 2222.8  |
| 759.68 | 2222.46 | 773.3  | 2222.26 | 792.88  | 2222.26 | 798.37 | 2222.31 | 802.82 | 2222.31 |
| 810.17 | 2222.64 | 815.61 | 2222.86 | 845.01  | 2223.08 | 845.82 | 2223.09 | 846.3  | 2223.1  |
| 857.41 | 2223.31 | 865.3  | 2223.32 | 869.52  | 2223.26 | 874.17 | 2223.13 | 891.06 | 2223.31 |
| 893.38 | 2223.23 | 894.34 | 2223.18 | 902.56  | 2222.8  | 903.21 | 2222.99 | 903.53 | 2223.08 |
| 904.62 | 2223.38 | 906.36 | 2223.87 | 906.87  | 2224.01 | 907.4  | 2224.39 | 909.64 | 2226.03 |
| 916.02 | 2225.99 | 926.54 | 2225.91 | 967.41  | 2225.71 | 978.37 | 2225.77 | 983.09 | 2226.81 |
| 983.29 | 2226.85 | 983.98 | 2226.83 | 1003.67 | 2226.56 |        |         |        |         |

Manning's n Values num= 3  
Sta n Val Sta n Val Sta n Val  
0 .02 232.31 .03 265.09 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
232.31 265.09 338.51 338.51 338.51 .1 .3  
Ineffective Flow num= 2  
Sta L Sta R Elev Permanent  
0 118 2225 F  
502.17 897.39 2223.04 F

## CROSS SECTION

RIVER: Rancho  
REACH: lower RS: 13038.48

## INPUT

## Description:

| Station | Elevation | Data   | num=    | 55     |         |        |         |        |         |
|---------|-----------|--------|---------|--------|---------|--------|---------|--------|---------|
| Sta     | Elev      | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    |
| 0       | 2212.81   | 10.35  | 2212.88 | 38.52  | 2213.11 | 76.27  | 2213.48 | 83.96  | 2213.57 |
| 99.36   | 2213.47   | 102.74 | 2213.46 | 104.5  | 2213.48 | 123.21 | 2213.6  | 138.69 | 2212.5  |
| 139.14  | 2212.41   | 141.65 | 2212.43 | 149.01 | 2212.4  | 160.08 | 2212.47 | 167.3  | 2212.56 |
| 174.39  | 2213.04   | 183.57 | 2213.7  | 195.66 | 2218.42 | 198.99 | 2219.73 | 201.72 | 2219.77 |
| 207.56  | 2219.88   | 211.9  | 2219.95 | 230.77 | 2220.07 | 251.65 | 2220.24 | 256.17 | 2220.32 |
| 273.91  | 2220.53   | 278.08 | 2220.44 | 320.75 | 2219.58 | 332.82 | 2219.34 | 338.69 | 2217.12 |
| 343.35  | 2215.24   | 348.09 | 2215.23 | 353.02 | 2215.3  | 364.9  | 2216.46 | 365.45 | 2216.51 |
| 366.36  | 2216.49   | 376.67 | 2216.14 | 383.44 | 2216.15 | 386.7  | 2216.15 | 398.45 | 2217.14 |
| 398.76  | 2217.17   | 418.95 | 2215.25 | 419.14 | 2215.23 | 419.34 | 2215.2  | 428.04 | 2215.98 |
| 430.64  | 2216.27   | 449.72 | 2216.42 | 462    | 2216.51 | 467.63 | 2216.57 | 490.49 | 2216.79 |
| 530.56  | 2217.34   | 541.88 | 2217.65 | 548.57 | 2223.07 | 548.93 | 2223.36 | 550.57 | 2223.36 |

Manning's n Values num= 3  
Sta n Val Sta n Val Sta n Val  
0 .02 332.82 .03 541.88 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
332.82 541.88 108.18 107.17 106.27 .1 .3  
Ineffective Flow num= 2  
Sta L Sta R Elev Permanent  
.67 273 2223.96 F  
539.88 550.57 2223.355 F

## CROSS SECTION

RIVER: Rancho  
REACH: lower RS: 12931.09

## INPUT

## Description:

| Station | Elevation | Data   | num=    | 61     |         |        |         |        |         |
|---------|-----------|--------|---------|--------|---------|--------|---------|--------|---------|
| Sta     | Elev      | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    |
| 0       | 2212.13   | 12.16  | 2212.19 | 22.33  | 2212.26 | 34.27  | 2212.24 | 46.78  | 2212.23 |
| 51.39   | 2212.31   | 61.54  | 2212.49 | 80.31  | 2212.61 | 86.17  | 2212.57 | 87.45  | 2212.57 |
| 94.11   | 2212.71   | 96.21  | 2212.73 | 100.21 | 2212.78 | 103.3  | 2212.81 | 107.11 | 2212.84 |
| 109.81  | 2212.85   | 117.72 | 2212.84 | 119.13 | 2212.84 | 121.93 | 2212.82 | 129.56 | 2212.86 |
| 139.13  | 2212.86   | 145.89 | 2212.87 | 164.84 | 2212.69 | 166.37 | 2212.7  | 168.22 | 2212.66 |
| 175.05  | 2212.56   | 178.7  | 2212.31 | 179.71 | 2212.18 | 182.55 | 2212.23 | 203.06 | 2212.97 |
| 208.34  | 2213.28   | 212.77 | 2215.58 | 219.02 | 2218.7  | 221.23 | 2218.77 | 223.11 | 2218.82 |
| 228.6   | 2218.94   | 247.06 | 2219.21 | 271.72 | 2219.63 | 283.82 | 2219.74 | 292.81 | 2219.81 |
| 324.46  | 2219.65   | 340.25 | 2219.57 | 341.55 | 2219.56 | 353.56 | 2215.2  | 355.69 | 2214.47 |
| 358.13  | 2215.19   | 361.62 | 2216.25 | 363.36 | 2215.95 | 369.33 | 2215.19 | 382.59 | 2215.11 |
| 384.11  | 2215.12   | 384.9  | 2215.57 | 384.99 | 2215.62 | 390.75 | 2215.62 | 446.43 | 2215.79 |
| 451.38  | 2215.81   | 452.94 | 2215.82 | 509.28 | 2216.2  | 556.44 | 2216.84 | 578.52 | 2217.15 |
| 596.22  | 2217.36   |        |         |        |         |        |         |        |         |

Manning's n Values num= 3  
Sta n Val Sta n Val Sta n Val  
0 .02 340.25 .03 556.44 .04

|                  |        |               |         |        |       |        |        |
|------------------|--------|---------------|---------|--------|-------|--------|--------|
| Bank Sta: Left   | Right  | Lengths: Left | Channel | Right  | Coeff | Contr. | Expan. |
| 340.25           | 556.44 | 209.82        | 212.15  | 214.23 |       | .1     | .3     |
| Ineffective Flow | num=   | 2             |         |        |       |        |        |
| Sta L Sta R      | Elev   | Permanent     |         |        |       |        |        |
| 0 292.8          | 2222   | F             |         |        |       |        |        |
| 549.73           | 596.22 | 2222          | F       |        |       |        |        |

## CROSS SECTION

RIVER: Rancho

REACH: lower RS: 12719.33

## INPUT

Description:

|         |           |        |         |        |         |        |         |        |         |
|---------|-----------|--------|---------|--------|---------|--------|---------|--------|---------|
| Station | Elevation | Data   | num=    | 116    |         |        |         |        |         |
| Sta     | Elev      | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    |
| 0       | 2214.37   | 11.96  | 2214.4  | 37.54  | 2214.57 | 38.53  | 2214.57 | 39.34  | 2214.58 |
| 40.04   | 2214.58   | 50.09  | 2214.65 | 58.6   | 2214.78 | 67.21  | 2214.89 | 78.99  | 2215.09 |
| 80.52   | 2215.07   | 80.97  | 2215.06 | 92.23  | 2214.86 | 95.33  | 2214.83 | 108.9  | 2214.66 |
| 116.31  | 2214.58   | 120.96 | 2214.54 | 127.04 | 2214.38 | 131.24 | 2214.34 | 138.19 | 2214.15 |
| 141.91  | 2214.11   | 148.92 | 2214.3  | 152.74 | 2214.27 | 159.34 | 2214.59 | 166.76 | 2214.99 |
| 170.85  | 2215.3    | 183.59 | 2215.95 | 185.42 | 2216.07 | 186.97 | 2216.18 | 195.56 | 2216.77 |
| 197.78  | 2216.78   | 198.59 | 2216.77 | 204.19 | 2216.69 | 207.9  | 2216.63 | 208.44 | 2216.6  |
| 219.48  | 2216.67   | 221.82 | 2216.7  | 225.59 | 2216.78 | 226.31 | 2216.78 | 233.03 | 2216.86 |
| 233.67  | 2216.85   | 233.82 | 2216.85 | 234.3  | 2216.86 | 234.86 | 2216.87 | 236.2  | 2216.9  |
| 236.74  | 2216.93   | 237.15 | 2216.97 | 282.83 | 2218.02 | 283.29 | 2218.03 | 283.72 | 2218.05 |
| 284.08  | 2218.06   | 287.72 | 2218.14 | 287.85 | 2218.14 | 298.07 | 2218.48 | 301.07 | 2218.42 |
| 354.13  | 2217.74   | 356    | 2217.71 | 357.99 | 2217.86 | 359.34 | 2212.96 | 366.27 | 2212.96 |
| 372.18  | 2212.96   | 373.65 | 2212.97 | 374.76 | 2212.97 | 381.34 | 2212.97 | 384.67 | 2215.34 |
| 388.22  | 2217.72   | 395.97 | 2217.41 | 398.56 | 2217.36 | 399.8  | 2217.28 | 401.45 | 2217.23 |
| 410.29  | 2216.92   | 413.73 | 2216.74 | 429.56 | 2215.68 | 437.05 | 2214.94 | 438.64 | 2214.86 |
| 440.64  | 2214.73   | 441.32 | 2214.69 | 449.38 | 2214.78 | 526.94 | 2216.07 | 528.4  | 2216.04 |
| 600.51  | 2216.76   | 603.06 | 2216.79 | 603.88 | 2217.4  | 604.12 | 2217.4  | 612.1  | 2217.44 |
| 613.43  | 2217.43   | 613.84 | 2217.44 | 618.48 | 2217.42 | 619.21 | 2217.42 | 623.54 | 2217.41 |
| 625.5   | 2217.42   | 633.15 | 2217.4  | 636.58 | 2217.42 | 642.62 | 2217.41 | 643.54 | 2217.35 |
| 644.61  | 2217.05   | 644.69 | 2217.01 | 707.33 | 2217.55 | 789.13 | 2217.82 | 813.12 | 2218.21 |
| 818.35  | 2218.51   | 822.19 | 2218.58 | 822.31 | 2218.58 | 825.89 | 2218.57 | 833.07 | 2218.6  |
| 837.41  | 2218.59   | 840.76 | 2221.24 | 841.31 | 2221.67 | 841.77 | 2221.63 | 861.46 | 2221.14 |
| 870.23  | 2221.19   | 873    | 2221.14 | 900.65 | 2220.79 | 923.39 | 2221.39 | 930.02 | 2221.39 |
| 936.04  | 2221.2    |        |         |        |         |        |         |        |         |

|                    |           |                |
|--------------------|-----------|----------------|
| Manning's n Values | num=      | 3              |
| Sta n Val          | Sta n Val | Sta n Val      |
| 0 .02              | 357.99    | .03 388.22 .04 |

|                  |        |               |         |        |       |        |        |
|------------------|--------|---------------|---------|--------|-------|--------|--------|
| Bank Sta: Left   | Right  | Lengths: Left | Channel | Right  | Coeff | Contr. | Expan. |
| 357.99           | 388.22 | 110.05        | 109.33  | 108.69 |       | .1     | .3     |
| Ineffective Flow | num=   | 2             |         |        |       |        |        |
| Sta L Sta R      | Elev   | Permanent     |         |        |       |        |        |
| 0 298            | 2220   | F             |         |        |       |        |        |
| 514.5            | 845    | 2220          | F       |        |       |        |        |

## CULVERT

RIVER: Rancho

REACH: lower RS: 12700

## INPUT

Description:

|                                   |                     |
|-----------------------------------|---------------------|
| Distance from Upstream XS =       | 10                  |
| Deck/Roadway Width =              | 78                  |
| Weir Coefficient =                | 2.6                 |
| Upstream Deck/Roadway Coordinates |                     |
| num=                              | 2                   |
| Sta Hi Cord Lo Cord               | Sta Hi Cord Lo Cord |
| 357 2217.86 2211                  | 388 2217.72 2211    |

## Upstream Bridge Cross Section Data

|         |           |        |         |        |         |        |         |        |         |
|---------|-----------|--------|---------|--------|---------|--------|---------|--------|---------|
| Station | Elevation | Data   | num=    | 116    |         |        |         |        |         |
| Sta     | Elev      | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    |
| 0       | 2214.37   | 11.96  | 2214.4  | 37.54  | 2214.57 | 38.53  | 2214.57 | 39.34  | 2214.58 |
| 40.04   | 2214.58   | 50.09  | 2214.65 | 58.6   | 2214.78 | 67.21  | 2214.89 | 78.99  | 2215.09 |
| 80.52   | 2215.07   | 80.97  | 2215.06 | 92.23  | 2214.86 | 95.33  | 2214.83 | 108.9  | 2214.66 |
| 116.31  | 2214.58   | 120.96 | 2214.54 | 127.04 | 2214.38 | 131.24 | 2214.34 | 138.19 | 2214.15 |
| 141.91  | 2214.11   | 148.92 | 2214.3  | 152.74 | 2214.27 | 159.34 | 2214.59 | 166.76 | 2214.99 |
| 170.85  | 2215.3    | 183.59 | 2215.95 | 185.42 | 2216.07 | 186.97 | 2216.18 | 195.56 | 2216.77 |
| 197.78  | 2216.78   | 198.59 | 2216.77 | 204.19 | 2216.69 | 207.9  | 2216.63 | 208.44 | 2216.6  |
| 219.48  | 2216.67   | 221.82 | 2216.7  | 225.59 | 2216.78 | 226.31 | 2216.78 | 233.03 | 2216.86 |
| 233.67  | 2216.85   | 233.82 | 2216.85 | 234.3  | 2216.86 | 234.86 | 2216.87 | 236.2  | 2216.9  |
| 236.74  | 2216.93   | 237.15 | 2216.97 | 282.83 | 2218.02 | 283.29 | 2218.03 | 283.72 | 2218.05 |
| 284.08  | 2218.06   | 287.72 | 2218.14 | 287.85 | 2218.14 | 298.07 | 2218.48 | 301.07 | 2218.42 |
| 354.13  | 2217.74   | 356    | 2217.71 | 357.99 | 2217.86 | 359.34 | 2212.96 | 366.27 | 2212.96 |
| 372.18  | 2212.96   | 373.65 | 2212.97 | 374.76 | 2212.97 | 381.34 | 2212.97 | 384.67 | 2215.34 |
| 388.22  | 2217.72   | 395.97 | 2217.41 | 398.56 | 2217.36 | 399.8  | 2217.28 | 401.45 | 2217.23 |
| 410.29  | 2216.92   | 413.73 | 2216.74 | 429.56 | 2215.68 | 437.05 | 2214.94 | 438.64 | 2214.86 |
| 440.64  | 2214.73   | 441.32 | 2214.69 | 449.38 | 2214.78 | 526.94 | 2216.07 | 528.4  | 2216.04 |
| 600.51  | 2216.76   | 603.06 | 2216.79 | 603.88 | 2217.4  | 604.12 | 2217.4  | 612.1  | 2217.44 |

|        |         |        |         |        |         |        |         |        |         |
|--------|---------|--------|---------|--------|---------|--------|---------|--------|---------|
| 613.43 | 2217.43 | 613.84 | 2217.44 | 618.48 | 2217.42 | 619.21 | 2217.42 | 623.54 | 2217.41 |
| 625.5  | 2217.42 | 633.15 | 2217.4  | 636.58 | 2217.42 | 642.62 | 2217.41 | 643.54 | 2217.35 |
| 644.61 | 2217.05 | 644.69 | 2217.01 | 707.33 | 2217.55 | 789.13 | 2217.82 | 813.12 | 2218.21 |
| 818.35 | 2218.51 | 822.19 | 2218.58 | 822.31 | 2218.58 | 825.89 | 2218.57 | 833.07 | 2218.6  |
| 837.41 | 2218.59 | 840.76 | 2221.24 | 841.31 | 2221.67 | 841.77 | 2221.63 | 861.46 | 2221.14 |
| 870.23 | 2221.19 | 873    | 2221.14 | 900.65 | 2220.79 | 923.39 | 2221.39 | 930.02 | 2221.39 |
| 936.04 | 2221.2  |        |         |        |         |        |         |        |         |

Manning's n Values num= 3

| Sta | n Val | Sta    | n Val | Sta    | n Val |
|-----|-------|--------|-------|--------|-------|
| 0   | .02   | 357.99 | .03   | 388.22 | .04   |

Bank Sta: Left Right Coeff Contr. Expan.  
357.99 388.22 .1 .3

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|-------|-------|------|-----------|
| 0     | 298   | 2220 | F         |
| 514.5 | 845   | 2220 | F         |

Downstream Deck/Roadway Coordinates num= 2

| Sta    | Hi      | Cord | Lo | Cord | Sta | Hi     | Cord | Lo | Cord |
|--------|---------|------|----|------|-----|--------|------|----|------|
| 371.47 | 2217.48 | 2211 |    |      | 395 | 2217.6 | 2211 |    |      |

Downstream Bridge Cross Section Data num= 103

| Station | Elevation | Data   | num=    | 103    | Sta     | Elev   | Sta     | Elev   | Sta     | Elev | Sta | Elev |
|---------|-----------|--------|---------|--------|---------|--------|---------|--------|---------|------|-----|------|
| 0       | 2214.03   | 10.34  | 2213.87 | 18.02  | 2214.05 | 33.08  | 2214.26 | 44.25  | 2214.24 |      |     |      |
| 46.67   | 2214.27   | 62.96  | 2214.4  | 66.05  | 2214.44 | 76.15  | 2214.76 | 81.77  | 2214.84 |      |     |      |
| 83.48   | 2214.84   | 92.57  | 2214.68 | 98.23  | 2214.76 | 117.17 | 2214.9  | 120.96 | 2214.92 |      |     |      |
| 138.3   | 2214.91   | 146.02 | 2214.95 | 157.1  | 2215.13 | 161.32 | 2215.26 | 170.27 | 2215.39 |      |     |      |
| 172.6   | 2215.38   | 175.26 | 2215.47 | 200.12 | 2215.7  | 200.5  | 2215.71 | 201.5  | 2215.74 |      |     |      |
| 207.22  | 2216.06   | 208.92 | 2216.23 | 210.89 | 2216.18 | 214.13 | 2216.11 | 221.16 | 2215.74 |      |     |      |
| 229.82  | 2215.91   | 230.93 | 2215.93 | 232.38 | 2215.96 | 241.65 | 2216.23 | 242.16 | 2216.27 |      |     |      |
| 242.63  | 2216.31   | 242.64 | 2216.31 | 243    | 2216.34 | 246.03 | 2216.43 | 246.45 | 2216.45 |      |     |      |
| 290.94  | 2217.32   | 291.79 | 2217.33 | 301.32 | 2217.49 | 301.74 | 2217.5  | 302.09 | 2217.5  |      |     |      |
| 305.37  | 2217.56   | 309.52 | 2217.61 | 311.68 | 2217.61 | 315.5  | 2217.59 | 349.19 | 2217.02 |      |     |      |
| 356.59  | 2216.87   | 358.15 | 2216.95 | 363.33 | 2217.2  | 368.45 | 2217.37 | 369.31 | 2217.4  |      |     |      |
| 371.47  | 2217.48   | 372.38 | 2212.9  | 372.51 | 2212.9  | 384.76 | 2212.9  | 388.49 | 2212.9  |      |     |      |
| 390.09  | 2212.9    | 392.93 | 2212.9  | 393.48 | 2217.59 | 395.65 | 2217.6  | 458.59 | 2218.17 |      |     |      |
| 458.72  | 2218.17   | 524.03 | 2218.58 | 525.4  | 2218.57 | 527.58 | 2218.61 | 528.87 | 2218.62 |      |     |      |
| 533.64  | 2218.6    | 549.56 | 2218.65 | 555.57 | 2217.5  | 563    | 2215.71 | 588.55 | 2216.07 |      |     |      |
| 596.78  | 2216.14   | 611.83 | 2216.37 | 625.91 | 2216.39 | 634.47 | 2216.46 | 647.4  | 2216.48 |      |     |      |
| 673.81  | 2216.73   | 691.5  | 2217.03 | 705.13 | 2217.15 | 745.49 | 2216.9  | 782.84 | 2216.97 |      |     |      |
| 808.28  | 2217.41   | 823.35 | 2218.06 | 826.39 | 2218.22 | 832.9  | 2218.96 | 836.74 | 2219.43 |      |     |      |
| 841.2   | 2219.38   | 848.89 | 2219.17 | 864.8  | 2219.31 | 866.05 | 2219.34 | 866.27 | 2219.34 |      |     |      |
| 868.3   | 2219.35   | 869.73 | 2219.29 | 871.5  | 2219.15 | 874.07 | 2219.01 | 878.8  | 2218.74 |      |     |      |
| 885.97  | 2218.84   | 893.65 | 2218.68 | 897.18 | 2218.76 |        |         |        |         |      |     |      |

Manning's n Values num= 3

| Sta | n Val | Sta    | n Val | Sta    | n Val |
|-----|-------|--------|-------|--------|-------|
| 0   | .02   | 371.47 | .03   | 395.65 | .04   |

Bank Sta: Left Right Coeff Contr. Expan.  
371.47 395.65 .1 .3

Ineffective Flow num= 2

| Sta L  | Sta R  | Elev | Permanent |
|--------|--------|------|-----------|
| 0      | 305    | 2219 | F         |
| 482.03 | 799.26 | 2219 | F         |

Upstream Embankment side slope = 0 horiz. to 1.0 vertical  
Downstream Embankment side slope = 0 horiz. to 1.0 vertical  
Maximum allowable submergence for weir flow = .95  
Elevation at which weir flow begins =  
Energy head used in spillway design =  
Spillway height used in design =  
Weir crest shape = Broad Crested

Number of Culverts = 1

| Culvert Name | Shape | Rise | Span |
|--------------|-------|------|------|
| Culvert #1   | Box   | 4    | 10   |

FHWA Chart # 8 - flared wingwalls  
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.  
Solution Criteria = Highest U.S. EG

| Culvert Upstrm Dist | Length | Top n | Bottom n | Depth Blocked | Entrance Loss Coef | Exit Loss Coef |
|---------------------|--------|-------|----------|---------------|--------------------|----------------|
| 10                  | 78     | .012  | .012     | 0             | .2                 | 1              |

Number of Barrels = 2  
Upstream Elevation = 2212.96  
Centerline Stations  
Sta. Sta.  
366 377  
Downstream Elevation = 2212.9  
Centerline Stations  
Sta. Sta.  
378 389

CROSS SECTION



RIVER: Rancho  
REACH: lower

RS: 12609.91

## INPUT

Description:

| Station | Elevation | Data   | num=    | 103    |         |        |         |        |         |
|---------|-----------|--------|---------|--------|---------|--------|---------|--------|---------|
| Sta     | Elev      | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    |
| 0       | 2214.03   | 10.34  | 2213.87 | 18.02  | 2214.05 | 33.08  | 2214.26 | 44.25  | 2214.24 |
| 46.67   | 2214.27   | 62.96  | 2214.4  | 66.05  | 2214.44 | 76.15  | 2214.76 | 81.77  | 2214.84 |
| 83.48   | 2214.84   | 92.57  | 2214.68 | 98.23  | 2214.76 | 117.17 | 2214.9  | 120.96 | 2214.92 |
| 138.3   | 2214.91   | 146.02 | 2214.95 | 157.1  | 2215.13 | 161.32 | 2215.26 | 170.27 | 2215.39 |
| 172.6   | 2215.38   | 175.26 | 2215.47 | 200.12 | 2215.7  | 200.5  | 2215.71 | 201.5  | 2215.74 |
| 207.22  | 2216.06   | 208.92 | 2216.23 | 210.89 | 2216.18 | 214.13 | 2216.11 | 221.16 | 2215.74 |
| 229.82  | 2215.91   | 230.93 | 2215.93 | 232.38 | 2215.96 | 241.65 | 2216.23 | 242.16 | 2216.27 |
| 242.63  | 2216.31   | 242.64 | 2216.31 | 243    | 2216.34 | 246.03 | 2216.43 | 246.45 | 2216.45 |
| 290.94  | 2217.32   | 291.79 | 2217.33 | 301.32 | 2217.49 | 301.74 | 2217.5  | 302.09 | 2217.5  |
| 305.37  | 2217.56   | 309.52 | 2217.61 | 311.68 | 2217.61 | 315.5  | 2217.59 | 349.19 | 2217.02 |
| 356.59  | 2216.87   | 358.15 | 2216.95 | 363.33 | 2217.2  | 368.45 | 2217.37 | 369.31 | 2217.4  |
| 371.47  | 2217.48   | 372.38 | 2212.9  | 372.51 | 2212.9  | 384.76 | 2212.9  | 388.49 | 2212.9  |
| 390.09  | 2212.9    | 392.93 | 2212.9  | 393.48 | 2217.59 | 395.65 | 2217.6  | 458.59 | 2218.17 |
| 458.72  | 2218.17   | 524.03 | 2218.58 | 525.4  | 2218.57 | 527.58 | 2218.61 | 528.87 | 2218.62 |
| 533.64  | 2218.6    | 549.56 | 2218.65 | 555.57 | 2217.5  | 563    | 2215.71 | 588.55 | 2216.07 |
| 596.78  | 2216.14   | 611.83 | 2216.37 | 625.91 | 2216.39 | 634.47 | 2216.46 | 647.4  | 2216.48 |
| 673.81  | 2216.73   | 691.5  | 2217.03 | 705.13 | 2217.15 | 745.49 | 2216.9  | 782.84 | 2216.97 |
| 808.28  | 2217.41   | 823.35 | 2218.06 | 826.39 | 2218.22 | 832.9  | 2218.96 | 836.74 | 2219.43 |
| 841.2   | 2219.38   | 848.89 | 2219.17 | 864.8  | 2219.31 | 866.05 | 2219.34 | 866.27 | 2219.34 |
| 868.3   | 2219.35   | 869.73 | 2219.29 | 871.5  | 2219.15 | 874.07 | 2219.01 | 878.8  | 2218.74 |
| 885.97  | 2218.84   | 893.65 | 2218.68 | 897.18 | 2218.76 |        |         |        |         |

| Manning's n | Values | num=   | 3     |
|-------------|--------|--------|-------|
| Sta         | n Val  | Sta    | n Val |
| 0           | .02    | 371.47 | .03   |
|             |        | 395.65 | .04   |

| Bank Sta:        | Left   | Right  | Lengths:  | Left  | Channel | Right  | Coeff | Contr. | Expan. |
|------------------|--------|--------|-----------|-------|---------|--------|-------|--------|--------|
|                  | 371.47 | 395.65 |           | 217.2 | 214.98  | 213.01 |       | .1     | .3     |
| Ineffective Flow | num=   |        | 2         |       |         |        |       |        |        |
| Sta L            | Sta R  | Elev   | Permanent |       |         |        |       |        |        |
| 0                | 305    | 2219   | F         |       |         |        |       |        |        |
| 482.03           | 799.26 | 2219   | F         |       |         |        |       |        |        |

## CROSS SECTION

RIVER: Rancho  
REACH: lower

RS: 12394.78

## INPUT

Description:

| Station | Elevation | Data   | num=    | 97     |         |        |         |        |         |
|---------|-----------|--------|---------|--------|---------|--------|---------|--------|---------|
| Sta     | Elev      | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    |
| 0       | 2209.41   | 22.48  | 2209.54 | 32.14  | 2209.72 | 45.81  | 2209.98 | 57.83  | 2210.07 |
| 67.42   | 2209.99   | 73.81  | 2209.99 | 79.2   | 2210.04 | 95.93  | 2210.3  | 103.3  | 2210.24 |
| 112.97  | 2210.48   | 121.2  | 2210.54 | 122.63 | 2210.53 | 128.88 | 2210.67 | 130.1  | 2210.78 |
| 137.68  | 2211.35   | 140.37 | 2211.39 | 151.57 | 2211.74 | 153.14 | 2211.79 | 153.37 | 2211.8  |
| 154.95  | 2211.81   | 169.41 | 2211.83 | 176.56 | 2211.9  | 192.5  | 2212.11 | 206.88 | 2212.4  |
| 218.51  | 2212.73   | 225.36 | 2212.96 | 233.64 | 2213.45 | 240.65 | 2213.75 | 250.23 | 2214.34 |
| 251.36  | 2214.44   | 253.75 | 2214.56 | 267.37 | 2215.29 | 269.34 | 2215.32 | 284.53 | 2215.51 |
| 308.96  | 2215.89   | 326.62 | 2216.16 | 331.25 | 2216.24 | 337.49 | 2216.13 | 347.31 | 2215.94 |
| 368.92  | 2215.52   | 369.65 | 2215.53 | 374.55 | 2215.6  | 376.21 | 2215.62 | 377.63 | 2215.81 |
| 382.29  | 2216.39   | 382.92 | 2214.65 | 383.32 | 2213.55 | 383.99 | 2211.87 | 386.32 | 2211.89 |
| 393.47  | 2211.85   | 399.57 | 2211.93 | 403.49 | 2212.02 | 405.04 | 2215.37 | 405.65 | 2216.7  |
| 412.56  | 2216.27   | 414.29 | 2216.17 | 414.58 | 2216.15 | 434.02 | 2216.72 | 450.61 | 2217.14 |
| 452.49  | 2217.13   | 481.62 | 2217.49 | 489.32 | 2217.59 | 491.04 | 2217.63 | 501.19 | 2217.9  |
| 504.39  | 2217.94   | 505.18 | 2217.99 | 519.31 | 2218.26 | 521.68 | 2218.22 | 528.47 | 2218.2  |
| 532.23  | 2218.22   | 534.26 | 2218.23 | 554.12 | 2218.41 | 618.95 | 2218.74 | 635.59 | 2216.99 |
| 643.53  | 2216.95   | 644.93 | 2217.7  | 646.92 | 2218.9  | 653.37 | 2218.75 | 666.94 | 2218.47 |
| 677.35  | 2218.51   | 682.1  | 2218.48 | 686.88 | 2218.02 | 703.32 | 2218.07 | 723.39 | 2218.18 |
| 726.46  | 2218.2    | 745.2  | 2218.37 | 761.25 | 2218.57 | 762.82 | 2218.31 | 764.63 | 2218.1  |
| 778.07  | 2218.25   | 804.58 | 2218.58 | 823.08 | 2218.77 | 863.47 | 2218.83 | 908.9  | 2219.09 |
| 915.29  | 2218.85   | 932.71 | 2218.38 |        |         |        |         |        |         |

| Manning's n | Values | num=   | 3     |
|-------------|--------|--------|-------|
| Sta         | n Val  | Sta    | n Val |
| 0           | .02    | 382.29 | .03   |
|             |        | 452.49 | .04   |

| Bank Sta:        | Left   | Right    | Lengths:  | Left  | Channel | Right | Coeff | Contr. | Expan. |
|------------------|--------|----------|-----------|-------|---------|-------|-------|--------|--------|
|                  | 382.29 | 452.49   |           | 88.44 | 88.52   | 88.59 |       | .1     | .3     |
| Ineffective Flow | num=   |          | 3         |       |         |       |       |        |        |
| Sta L            | Sta R  | Elev     | Permanent |       |         |       |       |        |        |
| 0                | 328    | 2219     | F         |       |         |       |       |        |        |
| 449.73           | 760.92 | 2218.567 | F         |       |         |       |       |        |        |
| 780.56           | 932.71 | 2218.377 | F         |       |         |       |       |        |        |

## CULVERT

RIVER: Rancho  
REACH: lower

RS: 12380

## INPUT

## Description:

Distance from Upstream XS = 10

Deck/Roadway Width = 70

Weir Coefficient = 2.6

## Upstream Deck/Roadway Coordinates

num= 4

| Sta | Hi | Cord | Lo | Cord | Sta | Hi | Cord | Lo | Cord | Sta | Hi | Cord | Lo | Cord |
|-----|----|------|----|------|-----|----|------|----|------|-----|----|------|----|------|
| 375 |    | 2216 |    | 2211 | 381 |    | 2217 |    | 2211 | 406 |    | 2217 |    | 2211 |
| 420 |    | 2216 |    | 2211 |     |    |      |    |      |     |    |      |    |      |

## Upstream Bridge Cross Section Data

## Station Elevation Data num= 97

| Sta    | Elev    | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    |
|--------|---------|--------|---------|--------|---------|--------|---------|--------|---------|
| 0      | 2209.41 | 22.48  | 2209.54 | 32.14  | 2209.72 | 45.81  | 2209.98 | 57.83  | 2210.07 |
| 67.42  | 2209.99 | 73.81  | 2209.99 | 79.2   | 2210.04 | 95.93  | 2210.3  | 103.3  | 2210.24 |
| 112.97 | 2210.48 | 121.2  | 2210.54 | 122.63 | 2210.53 | 128.88 | 2210.67 | 130.1  | 2210.78 |
| 137.68 | 2211.35 | 140.37 | 2211.39 | 151.57 | 2211.74 | 153.14 | 2211.79 | 153.37 | 2211.8  |
| 154.95 | 2211.81 | 169.41 | 2211.83 | 176.56 | 2211.9  | 192.5  | 2212.11 | 206.88 | 2212.4  |
| 218.51 | 2212.73 | 225.36 | 2212.96 | 233.64 | 2213.45 | 240.65 | 2213.75 | 250.23 | 2214.34 |
| 251.36 | 2214.44 | 253.75 | 2214.56 | 267.37 | 2215.29 | 269.34 | 2215.32 | 284.53 | 2215.51 |
| 308.96 | 2215.89 | 326.62 | 2216.16 | 331.25 | 2216.24 | 337.49 | 2216.13 | 347.31 | 2215.94 |
| 368.92 | 2215.52 | 369.65 | 2215.53 | 374.55 | 2215.6  | 376.21 | 2215.62 | 377.63 | 2215.81 |
| 382.29 | 2216.39 | 382.92 | 2214.65 | 383.32 | 2213.55 | 383.99 | 2211.87 | 386.32 | 2211.89 |
| 393.47 | 2211.85 | 399.57 | 2211.93 | 403.49 | 2212.02 | 405.04 | 2215.37 | 405.65 | 2216.7  |
| 412.56 | 2216.27 | 414.29 | 2216.17 | 414.58 | 2216.15 | 434.02 | 2216.72 | 450.61 | 2217.14 |
| 452.49 | 2217.13 | 481.62 | 2217.49 | 489.32 | 2217.59 | 491.04 | 2217.63 | 501.19 | 2217.9  |
| 504.39 | 2217.94 | 505.18 | 2217.99 | 519.31 | 2218.26 | 521.68 | 2218.22 | 528.47 | 2218.2  |
| 532.23 | 2218.22 | 534.26 | 2218.23 | 554.12 | 2218.41 | 618.95 | 2218.74 | 635.59 | 2216.99 |
| 643.53 | 2216.95 | 644.93 | 2217.7  | 646.92 | 2218.9  | 653.37 | 2218.75 | 666.94 | 2218.47 |
| 677.35 | 2218.51 | 682.1  | 2218.48 | 686.88 | 2218.02 | 703.32 | 2218.07 | 723.39 | 2218.18 |
| 726.46 | 2218.2  | 745.2  | 2218.37 | 761.25 | 2218.57 | 762.82 | 2218.31 | 764.63 | 2218.1  |
| 778.07 | 2218.25 | 804.58 | 2218.58 | 823.08 | 2218.77 | 863.47 | 2218.83 | 908.9  | 2219.09 |
| 915.29 | 2218.85 | 932.71 | 2218.38 |        |         |        |         |        |         |

## Manning's n Values

num= 3

| Sta | n Val | Sta    | n Val | Sta    | n Val |
|-----|-------|--------|-------|--------|-------|
| 0   | .02   | 382.29 | .03   | 452.49 | .04   |

| Bank Sta: | Left   | Right  | Coeff | Contr. | Expan. |
|-----------|--------|--------|-------|--------|--------|
|           | 382.29 | 452.49 |       | .1     | .3     |

## Ineffective Flow num= 3

| Sta L  | Sta R  | Elev     | Permanent |
|--------|--------|----------|-----------|
| 0      | 328    | 2219     | F         |
| 449.73 | 760.92 | 2218.567 | F         |
| 780.56 | 932.71 | 2218.377 | F         |

## Downstream Deck/Roadway Coordinates

num= 4

| Sta | Hi | Cord | Lo | Cord | Sta | Hi | Cord | Lo | Cord | Sta | Hi | Cord | Lo | Cord |
|-----|----|------|----|------|-----|----|------|----|------|-----|----|------|----|------|
| 210 |    | 2216 |    | 2211 | 219 |    | 2217 |    | 2211 | 252 |    | 2217 |    | 2211 |
| 265 |    | 2216 |    | 2211 |     |    |      |    |      |     |    |      |    |      |

## Downstream Bridge Cross Section Data

## Station Elevation Data num= 50

| Sta    | Elev    | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    |
|--------|---------|--------|---------|--------|---------|--------|---------|--------|---------|
| 0      | 2210.89 | 6      | 2210.93 | 25.35  | 2211.89 | 39.35  | 2212.49 | 65.44  | 2213.21 |
| 79.37  | 2213.77 | 88.5   | 2214    | 91.31  | 2214.1  | 93.62  | 2214.23 | 107.1  | 2215.11 |
| 107.69 | 2215.12 | 133.69 | 2215.69 | 145.67 | 2215.97 | 154.29 | 2215.91 | 166.99 | 2215.78 |
| 168.17 | 2215.77 | 169.37 | 2215.75 | 170.36 | 2215.73 | 206    | 2215.18 | 209.93 | 2215.5  |
| 219.05 | 2216.03 | 219.85 | 2213.13 | 220.07 | 2212.25 | 220.15 | 2211.9  | 221.24 | 2211.89 |
| 222.69 | 2211.89 | 240.3  | 2211.78 | 241.51 | 2211.79 | 243.63 | 2211.78 | 248.52 | 2214.56 |
| 250.06 | 2215.84 | 251.47 | 2215.89 | 254.65 | 2215.9  | 263.55 | 2215.99 | 269.67 | 2215.91 |
| 280.68 | 2216.22 | 287.04 | 2216.28 | 288.6  | 2216.28 | 289.82 | 2216.21 | 303.34 | 2216.4  |
| 303.77 | 2216.42 | 320.92 | 2216.64 | 321.44 | 2216.64 | 330.21 | 2216.66 | 330.5  | 2216.62 |
| 330.73 | 2216.6  | 334.34 | 2216.18 | 348.51 | 2214.55 | 349.67 | 2214.4  | 355.01 | 2214.15 |

## Manning's n Values

num= 3

| Sta | n Val | Sta    | n Val | Sta    | n Val |
|-----|-------|--------|-------|--------|-------|
| 0   | .02   | 219.05 | .03   | 251.47 | .04   |

| Bank Sta: | Left   | Right  | Coeff | Contr. | Expan. |
|-----------|--------|--------|-------|--------|--------|
|           | 219.05 | 251.47 |       | .1     | .3     |

## Ineffective Flow num= 2

| Sta L  | Sta R  | Elev    | Permanent |
|--------|--------|---------|-----------|
| 0      | 147.23 | 2216.89 | F         |
| 283.89 | 355.01 | 2217    | F         |

Upstream Embankment side slope = 0 horiz. to 1.0 vertical

Downstream Embankment side slope = 0 horiz. to 1.0 vertical

Maximum allowable submergence for weir flow = .95

Elevation at which weir flow begins =

Energy head used in spillway design =

Spillway height used in design =

Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name      Shape      Rise      Span  
 Culvert #1      Box      4      10  
 FHWA Chart # 8 - flared wingwalls  
 FHWA Scale # 1 - Wingwall flared 30 to 75 deg.  
 Solution Criteria = Highest U.S. EG  
 Culvert Upstrm Dist   Length      Top n      Bottom n      Depth Blocked      Entrance Loss Coef      Exit Loss Coef  
                          10      70      .012      .012      0      .2      1  
 Number of Barrels = 2  
 Upstream Elevation = 2211.85  
 Centerline Stations  
     Sta.      Sta.  
     389      400  
 Downstream Elevation = 2211.8  
 Centerline Stations  
     Sta.      Sta.  
     225      236

## CROSS SECTION

RIVER: Rancho  
 REACH: lower      RS: 12306.29

## INPUT

## Description:

| Station | Elevation | Data   | num=    | 50     | Sta     | Elev   | Sta     | Elev   | Sta     | Elev | Sta | Elev |
|---------|-----------|--------|---------|--------|---------|--------|---------|--------|---------|------|-----|------|
| 0       | 2210.89   | 88.5   | 2210.93 | 25.35  | 2211.89 | 39.35  | 2212.49 | 65.44  | 2213.21 |      |     |      |
| 79.37   | 2213.77   | 88.5   | 2214    | 91.31  | 2214.1  | 93.62  | 2214.23 | 107.1  | 2215.11 |      |     |      |
| 107.69  | 2215.12   | 133.69 | 2215.69 | 145.67 | 2215.97 | 154.29 | 2215.91 | 166.99 | 2215.78 |      |     |      |
| 168.17  | 2215.77   | 169.37 | 2215.75 | 170.36 | 2215.73 | 206    | 2215.18 | 209.93 | 2215.5  |      |     |      |
| 219.05  | 2216.03   | 219.85 | 2213.13 | 220.07 | 2212.25 | 220.15 | 2211.9  | 221.24 | 2211.89 |      |     |      |
| 222.69  | 2211.89   | 240.3  | 2211.78 | 241.51 | 2211.79 | 243.63 | 2211.78 | 248.52 | 2214.56 |      |     |      |
| 250.06  | 2215.84   | 251.47 | 2215.89 | 254.65 | 2215.9  | 263.55 | 2215.99 | 269.67 | 2215.91 |      |     |      |
| 280.68  | 2216.22   | 287.04 | 2216.28 | 288.6  | 2216.28 | 289.82 | 2216.21 | 303.34 | 2216.4  |      |     |      |
| 303.77  | 2216.42   | 320.92 | 2216.64 | 321.44 | 2216.64 | 330.21 | 2216.66 | 330.5  | 2216.62 |      |     |      |
| 330.73  | 2216.6    | 334.34 | 2216.18 | 348.51 | 2214.55 | 349.67 | 2214.4  | 355.01 | 2214.15 |      |     |      |

| Manning's n | Values | num=   | 3   | Sta    | n Val | Sta | n Val |
|-------------|--------|--------|-----|--------|-------|-----|-------|
| 0           | .02    | 219.05 | .03 | 251.47 | .04   |     |       |

| Bank Sta: | Left   | Right | Lengths: | Left  | Channel | Right | Coeff | Contr. | Expan. |
|-----------|--------|-------|----------|-------|---------|-------|-------|--------|--------|
| 219.05    | 251.47 | 68.05 | 68.95    | 69.75 |         |       | .1    | .3     |        |

| Ineffective Flow | num=   | 2       | Sta L | Sta R | Elev | Permanent |
|------------------|--------|---------|-------|-------|------|-----------|
| 0                | 147.23 | 2216.89 | F     |       |      |           |
| 283.89           | 355.01 | 2217    | F     |       |      |           |

## CROSS SECTION

RIVER: Rancho  
 REACH: lower      RS: 12237.41

## INPUT

## Description:

| Station | Elevation | Data   | num=    | 99     | Sta     | Elev   | Sta     | Elev   | Sta     | Elev | Sta | Elev |
|---------|-----------|--------|---------|--------|---------|--------|---------|--------|---------|------|-----|------|
| 0       | 2209.39   | 11.54  | 2209.33 | 14.61  | 2209.54 | 19.13  | 2209.84 | 47.21  | 2210.25 |      |     |      |
| 51.66   | 2210.31   | 52.32  | 2210.31 | 106.55 | 2210.49 | 107.5  | 2210.5  | 152.53 | 2210.76 |      |     |      |
| 170.62  | 2210.88   | 205.84 | 2210.8  | 207.78 | 2210.8  | 212.36 | 2210.91 | 227.23 | 2211.37 |      |     |      |
| 230.89  | 2211.48   | 239.9  | 2212    | 246.7  | 2212.21 | 251.99 | 2212.43 | 264.22 | 2214.22 |      |     |      |
| 268.62  | 2214.63   | 269.04 | 2214.64 | 277.97 | 2214.85 | 305.77 | 2215.57 | 319.82 | 2215.5  |      |     |      |
| 328.65  | 2215.44   | 369.79 | 2214.78 | 372.88 | 2214.73 | 373.69 | 2214.78 | 374.25 | 2214.81 |      |     |      |
| 377.54  | 2215      | 380.31 | 2215.16 | 380.52 | 2214.64 | 381.3  | 2212.65 | 381.57 | 2211.96 |      |     |      |
| 398.89  | 2212.11   | 402.06 | 2212.14 | 402.14 | 2212.14 | 402.25 | 2212.14 | 402.29 | 2212.14 |      |     |      |
| 402.32  | 2212.14   | 417.59 | 2211.75 | 418.56 | 2211.64 | 419.7  | 2211.67 | 422.23 | 2211.69 |      |     |      |
| 435.63  | 2212.26   | 438.76 | 2212.35 | 439.51 | 2213.33 | 442.42 | 2215.43 | 444.23 | 2216.75 |      |     |      |
| 453.84  | 2216.83   | 459.47 | 2216.86 | 461.77 | 2216.96 | 481.14 | 2217.04 | 513.44 | 2217.21 |      |     |      |
| 522.92  | 2217.11   | 525.85 | 2217.1  | 527.42 | 2217.18 | 529.67 | 2217.34 | 531.09 | 2217.26 |      |     |      |
| 533.58  | 2217.31   | 535.58 | 2217.27 | 540.04 | 2217.35 | 549.63 | 2217.38 | 588.98 | 2217.39 |      |     |      |
| 591.87  | 2217.36   | 593.05 | 2217.37 | 603.7  | 2217.28 | 608.71 | 2217.32 | 610.24 | 2217.37 |      |     |      |
| 613.1   | 2217.26   | 616    | 2217.2  | 625.49 | 2216.94 | 626.64 | 2216.69 | 627.08 | 2216.56 |      |     |      |
| 649.43  | 2216.86   | 672.63 | 2216.9  | 674.25 | 2216.86 | 686.08 | 2216.97 | 694.41 | 2217    |      |     |      |
| 708.3   | 2217.31   | 744.6  | 2217.65 | 765.78 | 2217.76 | 787.54 | 2217.91 | 789.06 | 2217.94 |      |     |      |
| 798.44  | 2218.01   | 848.8  | 2217.98 | 862.18 | 2217.94 | 881.35 | 2217.99 | 897.56 | 2218.02 |      |     |      |
| 909.85  | 2217.97   | 913.63 | 2217.94 | 922.55 | 2217.89 | 932.48 | 2217.86 | 933.91 | 2217.85 |      |     |      |
| 934.35  | 2217.85   | 945.5  | 2217.77 | 978.09 | 2217.74 | 981    | 2217.74 |        |         |      |     |      |

| Manning's n | Values | num=   | 3   | Sta    | n Val | Sta | n Val |
|-------------|--------|--------|-----|--------|-------|-----|-------|
| 0           | .02    | 380.52 | .03 | 442.42 | .04   |     |       |

| Bank Sta: | Left   | Right | Lengths: | Left  | Channel | Right | Coeff | Contr. | Expan. |
|-----------|--------|-------|----------|-------|---------|-------|-------|--------|--------|
| 380.52    | 442.42 | 85.77 | 85.39    | 85.04 |         |       | .1    | .3     |        |

| Ineffective Flow | num= | 3    | Sta L | Sta R | Elev | Permanent |
|------------------|------|------|-------|-------|------|-----------|
| 0                | 305  | 2219 | F     |       |      |           |

441.97 696.1 2219 F  
725.5 981 2219 F

## CROSS SECTION

RIVER: Rancho  
REACH: lower RS: 12152.03

## INPUT

Description:

| Station | Elevation | Data   | num=    | 92     | Sta     | Elev   | Sta     | Elev   | Sta     | Elev |
|---------|-----------|--------|---------|--------|---------|--------|---------|--------|---------|------|
| 0       | 2210.53   | 1.96   | 2210.54 | 25.58  | 2210.67 | 75.71  | 2210.84 | 90.9   | 2210.92 |      |
| 106.12  | 2210.9    | 121.34 | 2210.82 | 126.85 | 2210.89 | 133.68 | 2211.03 | 143.26 | 2212.6  |      |
| 150.16  | 2213.83   | 150.71 | 2213.84 | 158.66 | 2214.11 | 186.54 | 2215.23 | 203.69 | 2215.17 |      |
| 209.38  | 2215.12   | 227.34 | 2214.76 | 253.8  | 2214.19 | 255.68 | 2214.11 | 258.23 | 2214.3  |      |
| 259.53  | 2214.4    | 269.3  | 2215.17 | 271.5  | 2212.42 | 273.99 | 2211.8  | 275.84 | 2210    |      |
| 281.77  | 2209      | 293.21 | 2209    | 296.78 | 2209    | 298.99 | 2209    | 300.79 | 2209    |      |
| 309.11  | 2210      | 316.2  | 2211.26 | 318.28 | 2215.03 | 318.99 | 2216.35 | 319.76 | 2216.4  |      |
| 321.48  | 2216.42   | 327.1  | 2216.57 | 333.55 | 2216.69 | 339.45 | 2216.82 | 347.16 | 2216.82 |      |
| 361.2   | 2216.88   | 366.52 | 2216.82 | 371.09 | 2216.84 | 374.55 | 2216.85 | 377.08 | 2216.71 |      |
| 379.78  | 2216.71   | 387.08 | 2216.63 | 392.54 | 2216.52 | 394.08 | 2216.47 | 394.45 | 2216.26 |      |
| 394.82  | 2215.99   | 397.23 | 2215.98 | 398.64 | 2215.98 | 421.7  | 2216.21 | 436.42 | 2216.25 |      |
| 442.03  | 2216.24   | 481.52 | 2216.89 | 482.97 | 2216.91 | 483.92 | 2216.92 | 484.6  | 2216.93 |      |
| 486.95  | 2216.92   | 487.07 | 2216.91 | 488.56 | 2216.93 | 532.18 | 2216.87 | 535.43 | 2216.84 |      |
| 537.06  | 2216.81   | 558.08 | 2216.55 | 565.52 | 2216.32 | 576.09 | 2216.03 | 580.02 | 2215.92 |      |
| 606.01  | 2216.29   | 618.36 | 2216.4  | 628.47 | 2216.5  | 630.71 | 2216.52 | 638.8  | 2216.62 |      |
| 645.1   | 2216.77   | 655.82 | 2216.99 | 679.76 | 2217.62 | 692.29 | 2217.88 | 700.96 | 2217.91 |      |
| 706.84  | 2217.93   | 713.71 | 2217.86 | 724.09 | 2217.74 | 724.35 | 2217.74 | 725.22 | 2217.77 |      |
| 731.23  | 2217.95   | 733.25 | 2217.99 | 743.33 | 2218.05 | 753.12 | 2218.08 | 757.36 | 2218.11 |      |
| 785.61  | 2217.69   | 816.28 | 2217.64 |        |         |        |         |        |         |      |

Manning's n Values num= 3  
Sta n Val Sta n Val Sta n Val  
0 .02 269.3 .03 318.28 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
269.3 318.28 97.09 96.42 95.82 .1 .3  
Ineffective Flow num= 3  
Sta L Sta R Elev Permanent  
0 150.5 2218 F  
319.97 551.93 2218 F  
591.89 816.28 2217.643 F

## CULVERT

RIVER: Rancho  
REACH: lower RS: 12100

## INPUT

Description:

Distance from Upstream XS = 8.8  
Deck/Roadway Width = 64  
Weir Coefficient = 2.6  
Upstream Deck/Roadway Coordinates  
num= 2  
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord  
269.3 2215.17 2208 319.98 2216.4 2208

## Upstream Bridge Cross Section Data

| Station | Elevation | Data   | num=    | 92     | Sta     | Elev   | Sta     | Elev   | Sta     | Elev |
|---------|-----------|--------|---------|--------|---------|--------|---------|--------|---------|------|
| 0       | 2210.53   | 1.96   | 2210.54 | 25.58  | 2210.67 | 75.71  | 2210.84 | 90.9   | 2210.92 |      |
| 106.12  | 2210.9    | 121.34 | 2210.82 | 126.85 | 2210.89 | 133.68 | 2211.03 | 143.26 | 2212.6  |      |
| 150.16  | 2213.83   | 150.71 | 2213.84 | 158.66 | 2214.11 | 186.54 | 2215.23 | 203.69 | 2215.17 |      |
| 209.38  | 2215.12   | 227.34 | 2214.76 | 253.8  | 2214.19 | 255.68 | 2214.11 | 258.23 | 2214.3  |      |
| 259.53  | 2214.4    | 269.3  | 2215.17 | 271.5  | 2212.42 | 273.99 | 2211.8  | 275.84 | 2210    |      |
| 281.77  | 2209      | 293.21 | 2209    | 296.78 | 2209    | 298.99 | 2209    | 300.79 | 2209    |      |
| 309.11  | 2210      | 316.2  | 2211.26 | 318.28 | 2215.03 | 318.99 | 2216.35 | 319.76 | 2216.4  |      |
| 321.48  | 2216.42   | 327.1  | 2216.57 | 333.55 | 2216.69 | 339.45 | 2216.82 | 347.16 | 2216.82 |      |
| 361.2   | 2216.88   | 366.52 | 2216.82 | 371.09 | 2216.84 | 374.55 | 2216.85 | 377.08 | 2216.71 |      |
| 379.78  | 2216.71   | 387.08 | 2216.63 | 392.54 | 2216.52 | 394.08 | 2216.47 | 394.45 | 2216.26 |      |
| 394.82  | 2215.99   | 397.23 | 2215.98 | 398.64 | 2215.98 | 421.7  | 2216.21 | 436.42 | 2216.25 |      |
| 442.03  | 2216.24   | 481.52 | 2216.89 | 482.97 | 2216.91 | 483.92 | 2216.92 | 484.6  | 2216.93 |      |
| 486.95  | 2216.92   | 487.07 | 2216.91 | 488.56 | 2216.93 | 532.18 | 2216.87 | 535.43 | 2216.84 |      |
| 537.06  | 2216.81   | 558.08 | 2216.55 | 565.52 | 2216.32 | 576.09 | 2216.03 | 580.02 | 2215.92 |      |
| 606.01  | 2216.29   | 618.36 | 2216.4  | 628.47 | 2216.5  | 630.71 | 2216.52 | 638.8  | 2216.62 |      |
| 645.1   | 2216.77   | 655.82 | 2216.99 | 679.76 | 2217.62 | 692.29 | 2217.88 | 700.96 | 2217.91 |      |
| 706.84  | 2217.93   | 713.71 | 2217.86 | 724.09 | 2217.74 | 724.35 | 2217.74 | 725.22 | 2217.77 |      |
| 731.23  | 2217.95   | 733.25 | 2217.99 | 743.33 | 2218.05 | 753.12 | 2218.08 | 757.36 | 2218.11 |      |
| 785.61  | 2217.69   | 816.28 | 2217.64 |        |         |        |         |        |         |      |

Manning's n Values num= 3  
Sta n Val Sta n Val Sta n Val  
0 .02 269.3 .03 318.28 .04

Bank Sta: Left Right Coeff Contr. Expan.

269.3 318.28 .1 .3  
 Ineffective Flow num= 3  
 Sta L Sta R Elev Permanent  
 0 150.5 2218 F  
 319.97 551.93 2218 F  
 591.89 816.282217.643 F

Downstream Deck/Roadway Coordinates  
 num= 2  
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord  
 255 2214.7 2208 319.98 2216.4 2208

Downstream Bridge Cross Section Data  
 Station Elevation Data num= 115  

| Sta    | Elev    | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    |
|--------|---------|--------|---------|--------|---------|--------|---------|--------|---------|
| 0      | 2210.16 | 19.65  | 2210.48 | 26.9   | 2210.49 | 52.11  | 2210.58 | 62.28  | 2210.8  |
| 65.04  | 2210.54 | 86.4   | 2210.68 | 112.35 | 2210.8  | 116.33 | 2210.86 | 119.43 | 2210.84 |
| 124.36 | 2210.8  | 126.18 | 2210.92 | 130.35 | 2211.14 | 141.54 | 2212.93 | 144.35 | 2213.4  |
| 145.62 | 2213.59 | 146.64 | 2213.74 | 146.68 | 2213.74 | 149.96 | 2213.84 | 193.64 | 2214.7  |
| 194.4  | 2214.68 | 200.42 | 2214.7  | 204.55 | 2214.75 | 205.1  | 2214.76 | 212.46 | 2214.6  |
| 249.27 | 2213.83 | 251.22 | 2213.91 | 253.52 | 2214.03 | 255.94 | 2214.14 | 256.16 | 2214.16 |
| 256.38 | 2213.8  | 258.24 | 2211.27 | 258.4  | 2211.02 | 259.38 | 2211    | 274.17 | 2208.8  |
| 290.28 | 2208.8  | 291.52 | 2208.8  | 292.13 | 2208.8  | 292.31 | 2208.8  | 297.99 | 2210    |
| 311.22 | 2211.18 | 311.96 | 2212.18 | 314.97 | 2215.96 | 316.41 | 2216.1  | 319.04 | 2216.36 |
| 324.06 | 2216.38 | 334.77 | 2216.44 | 344.37 | 2216.39 | 350.53 | 2216.37 | 374.08 | 2215.91 |
| 374.22 | 2215.91 | 374.81 | 2215.89 | 381.4  | 2215.69 | 381.77 | 2215.63 | 383.1  | 2215.44 |
| 384.05 | 2215.42 | 384.84 | 2215.41 | 387.84 | 2215.36 | 388.37 | 2215.21 | 388.89 | 2215.1  |
| 391.54 | 2215.12 | 414.44 | 2215.18 | 414.59 | 2215.2  | 421.23 | 2216.02 | 422.43 | 2216.12 |
| 425.5  | 2216.2  | 456.68 | 2216.79 | 474.12 | 2217.06 | 475.59 | 2213.98 | 475.64 | 2213.91 |
| 475.69 | 2213.91 | 475.72 | 2213.91 | 477.59 | 2213.88 | 490.16 | 2213.74 | 490.62 | 2215.13 |
| 491.28 | 2217.14 | 500.38 | 2217.04 | 521.97 | 2216.76 | 524.73 | 2216.78 | 527.98 | 2216.75 |
| 536.92 | 2216.71 | 566.3  | 2216.86 | 573.96 | 2216.85 | 578.3  | 2216.85 | 600.78 | 2216.46 |
| 608.85 | 2216.39 | 610.19 | 2216.35 | 611.3  | 2216.37 | 617.17 | 2216.42 | 617.86 | 2216.43 |
| 618.49 | 2216.41 | 622.91 | 2216.12 | 623.81 | 2216.06 | 628.18 | 2215.71 | 630    | 2215.67 |
| 636.48 | 2215.74 | 666.63 | 2215.88 | 698.46 | 2216    | 706.66 | 2216.57 | 712.71 | 2216.78 |
| 723.67 | 2216.84 | 725.71 | 2216.89 | 734.56 | 2217.15 | 747.5  | 2217.26 | 767.26 | 2217.59 |
| 792.62 | 2217.49 | 798.83 | 2217.44 | 802.5  | 2217.39 | 811.06 | 2217.11 | 817.64 | 2216.97 |
| 826.69 | 2216.84 | 845.54 | 2216.69 | 850.92 | 2216.64 | 855.52 | 2216.54 | 861.49 | 2216.52 |

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 0 .02 256.38 .03 319.04 .04

Bank Sta: Left Right Coeff Contr. Expan.  
 256.38 319.04 .1 .3  
 Ineffective Flow num= 3  
 Sta L Sta R Elev Permanent  
 0 146.6 2218 F  
 312.2 474 2218 F  
 572.23 861.49 2218 F

Upstream Embankment side slope = 0 horiz. to 1.0 vertical  
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical  
 Maximum allowable submergence for weir flow = .95  
 Elevation at which weir flow begins =  
 Energy head used in spillway design =  
 Spillway height used in design =  
 Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name Shape Rise Span  
 Culvert #1 Box 3.82 10  
 FHWA Chart # 8 - flared wingwalls  
 FHWA Scale # 1 - Wingwall flared 30 to 75 deg.  
 Solution Criteria = Highest U.S. EG  

| Culvert | Upstrm Dist | Length | Top n | Bottom n | Depth Blocked | Entrance Loss Coef | Exit Loss Coef |
|---------|-------------|--------|-------|----------|---------------|--------------------|----------------|
| 8.8     | 64          | .012   | .012  | 0        | .2            | 1                  |                |

Number of Barrels = 3  
 Upstream Elevation = 2209  
 Centerline Stations  

| Sta. | Sta. | Sta. |
|------|------|------|
| 287  | 298  | 309  |

 Downstream Elevation = 2208.8  
 Centerline Stations  

| Sta. | Sta. | Sta. |
|------|------|------|
| 279  | 290  | 301  |

CROSS SECTION

RIVER: Rancho  
 REACH: lower RS: 12055.63

INPUT

Description:

Station Elevation Data num= 115  

| Sta | Elev    | Sta   | Elev    | Sta  | Elev    | Sta   | Elev    | Sta   | Elev   |
|-----|---------|-------|---------|------|---------|-------|---------|-------|--------|
| 0   | 2210.16 | 19.65 | 2210.48 | 26.9 | 2210.49 | 52.11 | 2210.58 | 62.28 | 2210.8 |

|        |         |        |         |        |         |        |         |        |         |
|--------|---------|--------|---------|--------|---------|--------|---------|--------|---------|
| 65.04  | 2210.54 | 86.4   | 2210.68 | 112.35 | 2210.8  | 116.33 | 2210.86 | 119.43 | 2210.84 |
| 124.36 | 2210.8  | 126.18 | 2210.92 | 130.35 | 2211.14 | 141.54 | 2212.93 | 144.35 | 2213.4  |
| 145.62 | 2213.59 | 146.64 | 2213.74 | 146.68 | 2213.74 | 149.96 | 2213.84 | 193.64 | 2214.7  |
| 194.4  | 2214.68 | 200.42 | 2214.7  | 204.55 | 2214.75 | 205.1  | 2214.76 | 212.46 | 2214.6  |
| 249.27 | 2213.83 | 251.22 | 2213.91 | 253.52 | 2214.03 | 255.94 | 2214.14 | 256.16 | 2214.16 |
| 256.38 | 2213.8  | 258.24 | 2211.27 | 258.4  | 2211.02 | 259.38 | 2211    | 274.17 | 2208.8  |
| 290.28 | 2208.8  | 291.52 | 2208.8  | 292.13 | 2208.8  | 292.31 | 2208.8  | 297.99 | 2210    |
| 311.22 | 2211.18 | 311.96 | 2212.18 | 314.97 | 2215.96 | 316.41 | 2216.1  | 319.04 | 2216.36 |
| 324.06 | 2216.38 | 334.77 | 2216.44 | 344.37 | 2216.39 | 350.53 | 2216.37 | 374.08 | 2215.91 |
| 374.22 | 2215.91 | 374.81 | 2215.89 | 381.4  | 2215.69 | 381.77 | 2215.63 | 383.1  | 2215.44 |
| 384.05 | 2215.42 | 384.84 | 2215.41 | 387.84 | 2215.36 | 388.37 | 2215.21 | 388.89 | 2215.1  |
| 391.54 | 2215.12 | 414.44 | 2215.18 | 414.59 | 2215.2  | 421.23 | 2216.02 | 422.43 | 2216.12 |
| 425.5  | 2216.2  | 456.68 | 2216.79 | 474.12 | 2217.06 | 475.59 | 2213.98 | 475.64 | 2213.91 |
| 475.69 | 2213.91 | 475.72 | 2213.91 | 477.59 | 2213.88 | 490.16 | 2213.74 | 490.62 | 2215.13 |
| 491.28 | 2217.14 | 500.38 | 2217.04 | 521.97 | 2216.76 | 524.73 | 2216.78 | 527.98 | 2216.75 |
| 536.92 | 2216.71 | 566.3  | 2216.86 | 573.96 | 2216.85 | 578.3  | 2216.85 | 600.78 | 2216.46 |
| 608.85 | 2216.39 | 610.19 | 2216.35 | 611.3  | 2216.37 | 617.17 | 2216.42 | 617.86 | 2216.43 |
| 618.49 | 2216.41 | 622.91 | 2216.12 | 623.81 | 2216.06 | 628.18 | 2215.71 | 630    | 2215.67 |
| 636.48 | 2215.74 | 666.63 | 2215.88 | 698.46 | 2216    | 706.66 | 2216.57 | 712.71 | 2216.78 |
| 723.67 | 2216.84 | 725.71 | 2216.89 | 734.56 | 2217.15 | 747.5  | 2217.26 | 767.26 | 2217.59 |
| 792.62 | 2217.49 | 798.83 | 2217.44 | 802.5  | 2217.39 | 811.06 | 2217.11 | 817.64 | 2216.97 |
| 826.69 | 2216.84 | 845.54 | 2216.69 | 850.92 | 2216.64 | 855.52 | 2216.54 | 861.49 | 2216.52 |

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 0 .02 256.38 .03 319.04 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 256.38 319.04 368.12 368.26 368.37 .1 .3  
 Ineffective Flow num= 3  
 Sta L Sta R Elev Permanent  
 0 146.6 2218 F  
 312.2 474 2218 F  
 572.23 861.49 2218 F

## CROSS SECTION

RIVER: Rancho  
 REACH: lower RS: 11687.51

## INPUT

## Description:

Station Elevation Data num= 116  

| Sta    | Elev    | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    |
|--------|---------|--------|---------|--------|---------|--------|---------|--------|---------|
| 0      | 2207.85 | 22.05  | 2207.66 | 29.13  | 2207.62 | 38.47  | 2207.49 | 56.3   | 2207.63 |
| 60.08  | 2207.7  | 61.62  | 2207.8  | 62.32  | 2207.86 | 71.27  | 2208.07 | 100.84 | 2208.68 |
| 109.8  | 2208.8  | 115.27 | 2209.02 | 118.06 | 2209.18 | 119.96 | 2209.28 | 137.24 | 2210.12 |
| 145.63 | 2210.58 | 149.72 | 2210.8  | 160.54 | 2211.25 | 164.07 | 2211.3  | 173.15 | 2211.76 |
| 173.66 | 2211.77 | 196.7  | 2212.44 | 208.79 | 2212.77 | 216.59 | 2212.67 | 231.81 | 2212.51 |
| 265.26 | 2211.95 | 276.13 | 2211.77 | 278.26 | 2211.91 | 280.94 | 2212.01 | 281.59 | 2211.97 |
| 281.92 | 2211.95 | 282.82 | 2212.08 | 285.24 | 2212.2  | 287    | 2212.38 | 287.21 | 2212.1  |
| 289.12 | 2209.64 | 293.12 | 2209.54 | 306.09 | 2209.38 | 324.12 | 2209.43 | 330    | 2209.43 |
| 331    | 2210.74 | 334    | 2213.59 | 343.87 | 2213.48 | 361.54 | 2213.34 | 377.1  | 2214    |
| 397.27 | 2214.84 | 405.06 | 2214.73 | 436.51 | 2214.72 | 451.51 | 2214.59 | 458.23 | 2214.59 |
| 478.89 | 2214.49 | 480.43 | 2214.48 | 504.1  | 2214.16 | 506.44 | 2214.27 | 510.69 | 2214.21 |
| 511.96 | 2214.21 | 524.43 | 2214.38 | 530.75 | 2213.91 | 531.85 | 2213.83 | 547.09 | 2212.93 |
| 548.23 | 2212.84 | 548.67 | 2212.84 | 550.64 | 2212.86 | 551.75 | 2212.77 | 554.96 | 2212.86 |
| 582.38 | 2213.28 | 585.08 | 2213.31 | 595.03 | 2213.5  | 595.73 | 2213.51 | 597.9  | 2213.5  |
| 606.16 | 2213.48 | 608.05 | 2213.53 | 628.77 | 2213.6  | 629.71 | 2213.63 | 638.73 | 2214.05 |
| 642.63 | 2214.22 | 652.59 | 2214.44 | 656.11 | 2214.51 | 660.84 | 2214.67 | 684.27 | 2214.87 |
| 691.14 | 2214.81 | 707.19 | 2214.6  | 713.51 | 2214.68 | 727.78 | 2214.49 | 733.54 | 2214.19 |
| 735.87 | 2214.42 | 745.08 | 2214.76 | 747.17 | 2214.86 | 749.98 | 2214.71 | 753.67 | 2214.59 |
| 761.19 | 2214.29 | 769.48 | 2213.75 | 792.91 | 2213.87 | 797.25 | 2213.89 | 803.53 | 2213.92 |
| 813.45 | 2213.96 | 831.9  | 2214.05 | 842.61 | 2214.08 | 850.43 | 2214.08 | 852.95 | 2213.06 |
| 855.35 | 2212.16 | 859    | 2212.2  | 860.26 | 2212.22 | 862.85 | 2212.27 | 877.04 | 2212.49 |
| 889.53 | 2212.71 | 890.26 | 2213.86 | 892.99 | 2218.28 | 896.06 | 2218.42 | 904.08 | 2218.77 |
| 922.64 | 2219.3  | 927.42 | 2218.74 | 931.53 | 2218.67 | 946.18 | 2218.51 | 948.51 | 2218.46 |
| 956.32 | 2218.69 |        |         |        |         |        |         |        |         |

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 0 .02 287 .03 334 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 287 334 79.27 79.37 79.45 .1 .3  
 Ineffective Flow num= 4  
 Sta L Sta R Elev Permanent  
 0 2082218.692 F  
 339 4292218.692 F  
 707.21 761.382218.692 F  
 895.16 956.322218.692 F

## CULVERT

RIVER: Rancho  
 REACH: lower RS: 11615

## INPUT

## Description:

Distance from Upstream XS = 23

Deck/Roadway Width = 45

Weir Coefficient = 2.6

Upstream Deck/Roadway Coordinates

num= 5

| Sta | Hi      | Cord | Lo | Cord | Sta | Hi      | Cord | Lo | Cord | Sta | Hi | Cord | Lo | Cord |
|-----|---------|------|----|------|-----|---------|------|----|------|-----|----|------|----|------|
| 282 | 2212.38 |      |    | 2208 | 287 |         |      |    | 2213 | 290 |    |      |    | 2208 |
| 332 | 2216    |      |    |      | 333 | 2213.59 |      |    | 2208 |     |    |      |    |      |

## Upstream Bridge Cross Section Data

| Station | Elevation | Data   | num=    | 116    |         |        |         |        |         |
|---------|-----------|--------|---------|--------|---------|--------|---------|--------|---------|
| Sta     | Elev      | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    |
| 0       | 2207.85   | 22.05  | 2207.66 | 29.13  | 2207.62 | 38.47  | 2207.49 | 56.3   | 2207.63 |
| 60.08   | 2207.7    | 61.62  | 2207.8  | 62.32  | 2207.86 | 71.27  | 2208.07 | 100.84 | 2208.68 |
| 109.8   | 2208.8    | 115.27 | 2209.02 | 118.06 | 2209.18 | 119.96 | 2209.28 | 137.24 | 2210.12 |
| 145.63  | 2210.58   | 149.72 | 2210.8  | 160.54 | 2211.25 | 164.07 | 2211.3  | 173.15 | 2211.76 |
| 173.66  | 2211.77   | 196.7  | 2212.44 | 208.79 | 2212.77 | 216.59 | 2212.67 | 231.81 | 2212.51 |
| 265.26  | 2211.95   | 276.13 | 2211.77 | 278.26 | 2211.91 | 280.94 | 2212.01 | 281.59 | 2211.97 |
| 281.92  | 2211.95   | 282.82 | 2212.08 | 285.24 | 2212.2  | 287    | 2212.38 | 287.21 | 2212.1  |
| 289.12  | 2209.64   | 293.12 | 2209.54 | 306.09 | 2209.38 | 324.12 | 2209.43 | 330    | 2209.43 |
| 331     | 2210.74   | 334    | 2213.59 | 343.87 | 2213.48 | 361.54 | 2213.34 | 377.1  | 2214    |
| 397.27  | 2214.84   | 405.06 | 2214.73 | 436.51 | 2214.72 | 451.51 | 2214.59 | 458.23 | 2214.59 |
| 478.89  | 2214.49   | 480.43 | 2214.48 | 504.1  | 2214.16 | 506.44 | 2214.27 | 510.69 | 2214.21 |
| 511.96  | 2214.21   | 524.43 | 2214.38 | 530.75 | 2213.91 | 531.85 | 2213.83 | 547.09 | 2212.93 |
| 548.23  | 2212.84   | 548.67 | 2212.84 | 550.64 | 2212.86 | 551.75 | 2212.77 | 554.96 | 2212.86 |
| 582.38  | 2213.28   | 585.08 | 2213.31 | 595.03 | 2213.5  | 595.73 | 2213.51 | 597.9  | 2213.5  |
| 606.16  | 2213.48   | 608.05 | 2213.53 | 628.77 | 2213.6  | 629.71 | 2213.63 | 638.73 | 2214.05 |
| 642.63  | 2214.22   | 652.59 | 2214.44 | 656.11 | 2214.51 | 660.84 | 2214.67 | 684.27 | 2214.87 |
| 691.14  | 2214.81   | 707.19 | 2214.6  | 713.51 | 2214.68 | 727.78 | 2214.49 | 733.54 | 2214.19 |
| 735.87  | 2214.42   | 745.08 | 2214.76 | 747.17 | 2214.86 | 749.98 | 2214.71 | 753.67 | 2214.59 |
| 761.19  | 2214.29   | 769.48 | 2213.75 | 792.91 | 2213.87 | 797.25 | 2213.89 | 803.53 | 2213.92 |
| 813.45  | 2213.96   | 831.9  | 2214.05 | 842.61 | 2214.08 | 850.43 | 2214.08 | 852.95 | 2213.06 |
| 855.35  | 2212.16   | 859    | 2212.2  | 860.26 | 2212.22 | 862.85 | 2212.27 | 877.04 | 2212.49 |
| 889.53  | 2212.71   | 890.26 | 2213.86 | 892.99 | 2218.28 | 896.06 | 2218.42 | 904.08 | 2218.77 |
| 922.64  | 2219.3    | 927.42 | 2218.74 | 931.53 | 2218.67 | 946.18 | 2218.51 | 948.51 | 2218.46 |
| 956.32  | 2218.69   |        |         |        |         |        |         |        |         |

## Manning's n Values

num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|-----|-------|-----|-------|-----|-------|
| 0   | .02   | 287 | .03   | 334 | .04   |

Bank Sta: Left Right Coeff Contr. Expan.

287 334 .1 .3

## Ineffective Flow

num= 4

| Sta L  | Sta R          | Elev | Permanent |
|--------|----------------|------|-----------|
| 0      | 2082218.692    |      | F         |
| 339    | 4292218.692    |      | F         |
| 707.21 | 761.382218.692 |      | F         |
| 895.16 | 956.322218.692 |      | F         |

## Downstream Deck/Roadway Coordinates

num= 6

| Sta    | Hi      | Cord | Lo | Cord | Sta | Hi | Cord | Lo | Cord | Sta | Hi      | Cord | Lo | Cord |
|--------|---------|------|----|------|-----|----|------|----|------|-----|---------|------|----|------|
| 310.77 | 2211.68 |      |    | 2208 | 313 |    |      |    | 2212 | 314 |         |      |    | 2208 |
| 363.71 | 2216    |      |    | 2208 | 365 |    |      |    | 2213 | 375 | 2212.69 |      |    | 2208 |

## Downstream Bridge Cross Section Data

| Station | Elevation | Data   | num=    | 159    |         |        |         |        |         |
|---------|-----------|--------|---------|--------|---------|--------|---------|--------|---------|
| Sta     | Elev      | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    |
| 0       | 2208.19   | .98    | 2208.18 | 4.47   | 2208.28 | 7.09   | 2208.51 | 9.55   | 2208.62 |
| 10.92   | 2208.68   | 13.54  | 2208.62 | 15.39  | 2208.63 | 29.61  | 2208.75 | 35.23  | 2208.79 |
| 42.25   | 2208.9    | 43.41  | 2208.91 | 45.43  | 2208.9  | 49.6   | 2208.78 | 63.68  | 2208.83 |
| 83.05   | 2209.03   | 91.24  | 2208.97 | 96.37  | 2208.91 | 113.18 | 2208.98 | 123.69 | 2208.83 |
| 133.29  | 2208.82   | 137.4  | 2208.81 | 158.78 | 2208.95 | 162.75 | 2208.96 | 164.65 | 2208.99 |
| 164.71  | 2209.06   | 166.03 | 2210.59 | 168.81 | 2211.63 | 171.36 | 2212.57 | 174.65 | 2212.43 |
| 191.44  | 2211.55   | 192.46 | 2211.5  | 217.34 | 2212.02 | 228.27 | 2212.3  | 248.22 | 2212.29 |
| 250.78  | 2212.27   | 266.26 | 2211.97 | 295.51 | 2211.41 | 299.56 | 2211.61 | 301.29 | 2211.69 |
| 302.74  | 2211.76   | 310.21 | 2211.66 | 310.77 | 2211.68 | 312.16 | 2211.3  | 317.62 | 2209.82 |
| 318.29  | 2209.55   | 319.11 | 2209.26 | 321.64 | 2209.27 | 327.06 | 2209.25 | 346.47 | 2209.13 |
| 355     | 2209.24   | 361.87 | 2212.17 | 363.71 | 2212.69 | 364.51 | 2212.67 | 370.81 | 2212.57 |
| 376.76  | 2212.21   | 391.82 | 2211.82 | 399.58 | 2211.75 | 405.06 | 2211.67 | 407.75 | 2211.61 |
| 412.22  | 2211.64   | 414.93 | 2211.63 | 420.61 | 2211.69 | 424.2  | 2211.7  | 433.4  | 2211.98 |
| 443.58  | 2211.97   | 445.91 | 2211.97 | 452.62 | 2212.17 | 453.23 | 2212.16 | 458.31 | 2212.23 |
| 462.03  | 2212.27   | 471.34 | 2212.28 | 471.41 | 2212.28 | 472.77 | 2212.28 | 484.77 | 2212.28 |
| 485.31  | 2212.29   | 486.95 | 2212.29 | 499.12 | 2212.3  | 505.19 | 2212.3  | 508.22 | 2212.31 |
| 516.81  | 2212.31   | 519.74 | 2212.32 | 527.72 | 2212.32 | 530.81 | 2212.34 | 533.15 | 2212.35 |
| 545.83  | 2212.48   | 546.9  | 2212.49 | 548.12 | 2212.59 | 551.57 | 2212.88 | 552.77 | 2212.85 |
| 556.51  | 2212.69   | 561.75 | 2212.44 | 562.95 | 2212.38 | 566.56 | 2212.75 | 578.13 | 2214.16 |
| 582.77  | 2214.06   | 587.97 | 2214.07 | 590.71 | 2214.05 | 592.34 | 2214    | 595.35 | 2214.04 |
| 598.59  | 2214.05   | 638.86 | 2214.26 | 653.52 | 2214.22 | 656.62 | 2214.07 | 661.63 | 2213.97 |
| 669.8   | 2213.76   | 675.63 | 2213.62 | 679.92 | 2213.49 | 683.91 | 2213.48 | 693.66 | 2213.33 |
| 702.26  | 2213.15   | 708.68 | 2213.15 | 718.25 | 2213.39 | 727.23 | 2213.43 | 730.17 | 2213.41 |
| 733.37  | 2213.45   | 740.63 | 2212    | 743.15 | 2211.49 | 745.85 | 2211.15 | 751.37 | 2211.29 |
| 753.19  | 2211.32   | 759.38 | 2211.44 | 760.09 | 2211.51 | 773.74 | 2211.63 | 783.49 | 2211.67 |
| 790.85  | 2211.78   | 792.53 | 2211.81 | 794.02 | 2213.87 | 797.74 | 2218.98 | 799.74 | 2218.98 |
| 800.72  | 2219.04   | 805.93 | 2219.23 | 811.29 | 2219.42 | 816.96 | 2219.61 | 818.12 | 2219.64 |
| 819.92  | 2219.69   | 824.41 | 2219.77 | 838.01 | 2219.83 | 852.2  | 2219.8  | 881.22 | 2219.58 |

|         |         |         |         |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 894.04  | 2219.08 | 902.69  | 2219.15 | 913.41  | 2218.41 | 921.32  | 2218.49 | 931.78  | 2218.73 |
| 933.67  | 2218.68 | 943.51  | 2218.76 | 961.87  | 2218.31 | 965.51  | 2218.14 | 994.76  | 2217.23 |
| 994.8   | 2217.23 | 994.81  | 2217.23 | 994.82  | 2217.23 | 994.83  | 2217.23 | 1009.86 | 2217.36 |
| 1027.38 | 2217.59 | 1032.67 | 2217.65 | 1034.84 | 2217.68 | 1037.62 | 2217.72 |         |         |

Manning's n Values num= 3

| Sta | n Val | Sta    | n Val | Sta    | n Val |
|-----|-------|--------|-------|--------|-------|
| 0   | .02   | 310.77 | .03   | 363.71 | .04   |

Bank Sta: Left Right Coeff Contr. Expan.  
310.77 363.71 .1 .3

Ineffective Flow num= 4

| Sta L  | Sta R   | Elev    | Permanent |
|--------|---------|---------|-----------|
| 0      | 171     | 2214    | F         |
| 361    | 420.56  | 2215    | F         |
| 771.36 | 799.11  | 2218.98 | F         |
| 806.53 | 1037.62 | 2219.25 | F         |

Upstream Embankment side slope = 0 horiz. to 1.0 vertical  
Downstream Embankment side slope = 0 horiz. to 1.0 vertical  
Maximum allowable submergence for weir flow = .95  
Elevation at which weir flow begins =  
Energy head used in spillway design =  
Spillway height used in design =  
Weir crest shape = Broad Crested

Number of Culverts = 1

| Culvert Name | Shape | Rise | Span |
|--------------|-------|------|------|
| Culvert #1   | Box   | 3.42 | 14   |

FHWA Chart # 8 - flared wingwalls  
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.  
Solution Criteria = Highest U.S. EG  
Culvert Upstrm Dist Length Top n Bottom n Depth Blocked Entrance Loss Coef Exit Loss Coef  
23 45 .012 .012 0 .2 1

Number of Barrels = 3

Upstream Elevation = 2209.4

Centerline Stations

| Sta. | Sta. | Sta. |
|------|------|------|
| 296  | 311  | 326  |

Downstream Elevation = 2209.2

Centerline Stations

| Sta. | Sta. | Sta. |
|------|------|------|
| 322  | 337  | 352  |

# CROSS SECTION

RIVER: Rancho

REACH: lower RS: 11608.09

## INPUT

Description:

| Station | Elevation | Data    | num=    | 159     |         |         |         |         |         |
|---------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|
| Sta     | Elev      | Sta     | Elev    | Sta     | Elev    | Sta     | Elev    | Sta     | Elev    |
| 0       | 2208.19   | .98     | 2208.18 | 4.47    | 2208.28 | 7.09    | 2208.51 | 9.55    | 2208.62 |
| 10.92   | 2208.68   | 13.54   | 2208.62 | 15.39   | 2208.63 | 29.61   | 2208.75 | 35.23   | 2208.79 |
| 42.25   | 2208.9    | 43.41   | 2208.91 | 45.43   | 2208.9  | 49.6    | 2208.78 | 63.68   | 2208.83 |
| 83.05   | 2209.03   | 91.24   | 2208.97 | 96.37   | 2208.91 | 113.18  | 2208.98 | 123.69  | 2208.83 |
| 133.29  | 2208.82   | 137.4   | 2208.81 | 158.78  | 2208.95 | 162.75  | 2208.96 | 164.65  | 2208.99 |
| 164.71  | 2209.06   | 166.03  | 2210.59 | 168.81  | 2211.63 | 171.36  | 2212.57 | 174.65  | 2212.43 |
| 191.44  | 2211.55   | 192.46  | 2211.5  | 217.34  | 2212.02 | 228.27  | 2212.3  | 248.22  | 2212.29 |
| 250.78  | 2212.27   | 266.26  | 2211.97 | 295.51  | 2211.41 | 299.56  | 2211.61 | 301.29  | 2211.69 |
| 302.74  | 2211.76   | 310.21  | 2211.66 | 310.77  | 2211.68 | 312.16  | 2211.3  | 317.62  | 2209.82 |
| 318.29  | 2209.55   | 319.11  | 2209.26 | 321.64  | 2209.27 | 327.06  | 2209.25 | 346.47  | 2209.13 |
| 355     | 2209.24   | 361.87  | 2212.17 | 363.71  | 2212.69 | 364.51  | 2212.67 | 370.81  | 2212.57 |
| 376.76  | 2212.21   | 391.82  | 2211.82 | 399.58  | 2211.75 | 405.06  | 2211.67 | 407.75  | 2211.61 |
| 412.22  | 2211.64   | 414.93  | 2211.63 | 420.61  | 2211.69 | 424.2   | 2211.7  | 433.4   | 2211.98 |
| 443.58  | 2211.97   | 445.91  | 2211.97 | 452.62  | 2212.17 | 453.23  | 2212.16 | 458.31  | 2212.23 |
| 462.03  | 2212.27   | 471.34  | 2212.28 | 471.41  | 2212.28 | 472.77  | 2212.28 | 484.77  | 2212.28 |
| 485.31  | 2212.29   | 486.95  | 2212.29 | 499.12  | 2212.3  | 505.19  | 2212.3  | 508.22  | 2212.31 |
| 516.81  | 2212.31   | 519.74  | 2212.32 | 527.72  | 2212.32 | 530.81  | 2212.34 | 533.15  | 2212.35 |
| 545.83  | 2212.48   | 546.9   | 2212.49 | 548.12  | 2212.59 | 551.57  | 2212.88 | 552.77  | 2212.85 |
| 556.51  | 2212.69   | 561.75  | 2212.44 | 562.95  | 2212.38 | 566.56  | 2212.75 | 578.13  | 2214.16 |
| 582.77  | 2214.06   | 587.97  | 2214.07 | 590.71  | 2214.05 | 592.34  | 2214    | 595.35  | 2214.04 |
| 598.59  | 2214.05   | 638.86  | 2214.26 | 653.52  | 2214.22 | 656.62  | 2214.07 | 661.63  | 2213.97 |
| 669.8   | 2213.76   | 675.63  | 2213.62 | 679.92  | 2213.49 | 683.91  | 2213.48 | 693.66  | 2213.33 |
| 702.26  | 2213.15   | 708.68  | 2213.15 | 718.25  | 2213.39 | 727.23  | 2213.43 | 730.17  | 2213.41 |
| 733.37  | 2213.45   | 740.63  | 2212    | 743.15  | 2211.49 | 745.85  | 2211.15 | 751.37  | 2211.29 |
| 753.19  | 2211.32   | 759.38  | 2211.44 | 760.09  | 2211.51 | 773.74  | 2211.63 | 783.49  | 2211.67 |
| 790.85  | 2211.78   | 792.53  | 2211.81 | 794.02  | 2213.87 | 797.74  | 2218.98 | 799.74  | 2218.98 |
| 800.72  | 2219.04   | 805.93  | 2219.23 | 811.29  | 2219.42 | 816.96  | 2219.61 | 818.12  | 2219.64 |
| 819.92  | 2219.69   | 824.41  | 2219.77 | 838.01  | 2219.83 | 852.2   | 2219.8  | 881.22  | 2219.58 |
| 894.04  | 2219.08   | 902.69  | 2219.15 | 913.41  | 2218.41 | 921.32  | 2218.49 | 931.78  | 2218.73 |
| 933.67  | 2218.68   | 943.51  | 2218.76 | 961.87  | 2218.31 | 965.51  | 2218.14 | 994.76  | 2217.23 |
| 994.8   | 2217.23   | 994.81  | 2217.23 | 994.82  | 2217.23 | 994.83  | 2217.23 | 1009.86 | 2217.36 |
| 1027.38 | 2217.59   | 1032.67 | 2217.65 | 1034.84 | 2217.68 | 1037.62 | 2217.72 |         |         |

Manning's n Values num= 3



|     |       |        |       |        |       |
|-----|-------|--------|-------|--------|-------|
| Sta | n Val | Sta    | n Val | Sta    | n Val |
| 0   | .02   | 310.77 | .03   | 363.71 | .04   |

|                  |         |         |           |       |         |        |       |        |        |
|------------------|---------|---------|-----------|-------|---------|--------|-------|--------|--------|
| Bank Sta:        | Left    | Right   | Lengths:  | Left  | Channel | Right  | Coeff | Contr. | Expan. |
|                  | 310.77  | 363.71  |           | 125.7 | 125.36  | 125.06 |       | .1     | .3     |
| Ineffective Flow |         |         | num=      | 4     |         |        |       |        |        |
| Sta L            | Sta R   | Elev    | Permanent |       |         |        |       |        |        |
| 0                | 171     | 2214    | F         |       |         |        |       |        |        |
| 361              | 420.56  | 2215    | F         |       |         |        |       |        |        |
| 771.36           | 799.11  | 2218.98 | F         |       |         |        |       |        |        |
| 806.53           | 1037.62 | 2219.25 | F         |       |         |        |       |        |        |

## CROSS SECTION

RIVER: Rancho  
 REACH: lower RS: 11482.64

## INPUT

Description: Peak channel blocked w/ ineffective area

| Station | Elevation | Data   | num=    | 127    |         |        |         |        |         |
|---------|-----------|--------|---------|--------|---------|--------|---------|--------|---------|
| Sta     | Elev      | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    |
| 0       | 2207.55   | 4.2    | 2207.57 | 34.03  | 2207.44 | 42.83  | 2207.64 | 49.46  | 2207.68 |
| 68.17   | 2207.76   | 72.18  | 2207.79 | 72.45  | 2207.8  | 76.74  | 2207.95 | 110.8  | 2209.09 |
| 171.15  | 2209.8    | 224.59 | 2210.39 | 226.47 | 2210.3  | 228.1  | 2210.35 | 233.62 | 2210.33 |
| 234.01  | 2210.34   | 237.59 | 2211.74 | 237.91 | 2211.88 | 253    | 2210.97 | 253.23 | 2210.95 |
| 255.71  | 2210.83   | 265.07 | 2211.04 | 295.18 | 2211.77 | 316.9  | 2211.65 | 316.92 | 2211.65 |
| 316.93  | 2211.65   | 316.95 | 2211.65 | 364.52 | 2210.96 | 368.29 | 2211.12 | 368.8  | 2211.14 |
| 370.6   | 2211.21   | 375.25 | 2210.59 | 376.83 | 2210.38 | 377.43 | 2210.2  | 385.52 | 2207.54 |
| 399.44  | 2207.4    | 413.07 | 2207.34 | 418.78 | 2209.46 | 421.17 | 2209.95 | 424.39 | 2210.67 |
| 426.03  | 2210.68   | 431.01 | 2210.52 | 434.45 | 2210.6  | 447.31 | 2210.75 | 461.5  | 2210.9  |
| 473.95  | 2211.11   | 475.14 | 2211.11 | 518.22 | 2211.65 | 518.64 | 2211.66 | 518.7  | 2211.66 |
| 518.78  | 2211.66   | 543.17 | 2211.88 | 547.6  | 2211.96 | 561.48 | 2212.08 | 571.45 | 2212.16 |
| 580.07  | 2212.32   | 585.52 | 2212.47 | 595.88 | 2212.74 | 599.65 | 2212.85 | 607.13 | 2212.92 |
| 615.25  | 2212.91   | 618.44 | 2212.91 | 620.49 | 2212.97 | 621.85 | 2212.93 | 623.12 | 2213.11 |
| 628.21  | 2213.3    | 629.99 | 2213.08 | 631.93 | 2213.45 | 635.19 | 2213.41 | 638    | 2213.36 |
| 638.33  | 2213.36   | 639.79 | 2209.15 | 640.25 | 2207.83 | 642.85 | 2207.8  | 646.03 | 2207.76 |
| 650.2   | 2207.72   | 652.48 | 2207.69 | 653.97 | 2207.68 | 659.37 | 2207.61 | 659.44 | 2207.61 |
| 659.78  | 2207.61   | 661.32 | 2207.59 | 663.89 | 2211.04 | 667.34 | 2215.89 | 668.95 | 2215.86 |
| 691.91  | 2215.65   | 704.73 | 2215.82 | 705.17 | 2215.83 | 706.42 | 2215.83 | 706.63 | 2215.83 |
| 729.9   | 2215.8    | 747.21 | 2215.63 | 763.96 | 2215.43 | 768.82 | 2215.52 | 769    | 2215.52 |
| 770.09  | 2215.39   | 772.01 | 2215.15 | 772.12 | 2215.14 | 772.32 | 2215.13 | 775.42 | 2215.02 |
| 776.9   | 2215.02   | 781.52 | 2215.04 | 787.05 | 2215.02 | 829.53 | 2214.98 | 846.94 | 2214.89 |
| 848.25  | 2214.89   | 862.19 | 2214.89 | 886.78 | 2214.89 | 899.46 | 2214.91 | 903.53 | 2214.89 |
| 905.02  | 2215.83   | 905.66 | 2216.27 | 907.46 | 2216.21 | 908.91 | 2216.15 | 909.88 | 2216.11 |
| 910.11  | 2215.71   | 910.48 | 2215.05 | 913.32 | 2215.06 | 919.28 | 2215.11 | 930.88 | 2215.24 |
| 931.11  | 2215.43   | 933.55 | 2217.4  | 941.6  | 2217.59 | 953.32 | 2217.9  | 967.13 | 2218.04 |
| 969.8   | 2217.87   | 973.78 | 2217.91 |        |         |        |         |        |         |

|                    |       |        |       |
|--------------------|-------|--------|-------|
| Manning's n Values |       | num=   | 3     |
| Sta                | n Val | Sta    | n Val |
| 0                  | .02   | 370.6  | .03   |
|                    |       | 426.03 | .04   |

|                  |        |          |           |        |         |       |       |        |        |
|------------------|--------|----------|-----------|--------|---------|-------|-------|--------|--------|
| Bank Sta:        | Left   | Right    | Lengths:  | Left   | Channel | Right | Coeff | Contr. | Expan. |
|                  | 370.6  | 426.03   |           | 138.85 | 136.26  | 134   |       | .1     | .3     |
| Ineffective Flow |        |          | num=      | 3      |         |       |       |        |        |
| Sta L            | Sta R  | Elev     | Permanent |        |         |       |       |        |        |
| 0                | 295    | 2214     | F         |        |         |       |       |        |        |
| 600              | 942.43 | 2217.616 | F         |        |         |       |       |        |        |
| 948.5            | 973.78 | 2217.913 | F         |        |         |       |       |        |        |

## CROSS SECTION

RIVER: Rancho  
 REACH: lower RS: 11346.39

## INPUT

Description: Peak Channel 15' wide box

| Station | Elevation | Data   | num=    | 221    |         |        |         |        |         |
|---------|-----------|--------|---------|--------|---------|--------|---------|--------|---------|
| Sta     | Elev      | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    |
| 0       | 2208.89   | .75    | 2208.9  | 10.26  | 2209.19 | 17.5   | 2209.37 | 23.05  | 2209.43 |
| 23.71   | 2209.45   | 27.24  | 2209.5  | 27.53  | 2209.5  | 31.53  | 2209.63 | 35.85  | 2210.87 |
| 36.84   | 2211.17   | 37.41  | 2211.1  | 46.24  | 2210.32 | 49.33  | 2210.05 | 94.66  | 2211.06 |
| 99.04   | 2211.09   | 107.2  | 2211.11 | 135.26 | 2210.63 | 173.26 | 2210.12 | 174.22 | 2210.1  |
| 174.46  | 2210.11   | 174.77 | 2210.11 | 180.46 | 2210.17 | 182.12 | 2210.16 | 186.59 | 2210.2  |
| 196.74  | 2209.75   | 200.9  | 2209.52 | 207.15 | 2209.49 | 220.23 | 2209.22 | 222.03 | 2209.27 |
| 225.95  | 2209.36   | 234.77 | 2209.6  | 246.22 | 2209.85 | 247.59 | 2210    | 248.98 | 2210.18 |
| 253.92  | 2210.75   | 254.87 | 2210.9  | 259    | 2210.65 | 273    | 2210.59 | 273.01 | 2204.6  |
| 285.36  | 2204.6    | 285.94 | 2204.6  | 286.32 | 2204.6  | 288.04 | 2204.6  | 288.1  | 2210    |
| 296.81  | 2214.02   | 299.99 | 2214.08 | 300.58 | 2214.08 | 310.01 | 2214.25 | 316.65 | 2214.88 |
| 321.98  | 2215.25   | 326.13 | 2215.45 | 330.64 | 2215.71 | 333.4  | 2215.68 | 336    | 2215.72 |
| 351.67  | 2215.85   | 407.77 | 2216.11 | 434.52 | 2216.09 | 440.08 | 2216    | 443.37 | 2216    |
| 443.99  | 2215.94   | 446.12 | 2215.9  | 449.53 | 2215.77 | 451.69 | 2215.93 | 458.1  | 2215.9  |
| 460.87  | 2216.08   | 492.15 | 2215.89 | 499.08 | 2215.77 | 500.78 | 2215.75 | 503.87 | 2215.73 |
| 519.04  | 2215.45   | 524.94 | 2215.04 | 526.15 | 2214.94 | 532.17 | 2214.68 | 533.72 | 2214.62 |
| 548.32  | 2214.61   | 558.17 | 2214.42 | 565.43 | 2214.25 | 585.79 | 2214.16 | 590.16 | 2214.09 |
| 593.07  | 2214.09   | 595.41 | 2214.08 | 597.65 | 2214.12 | 602.71 | 2214.1  | 606.8  | 2214.18 |
| 620.26  | 2214.28   | 625.33 | 2214.29 | 631.24 | 2214.33 | 654.1  | 2214.41 | 654.69 | 2214.4  |

|         |         |         |         |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 655.54  | 2214.43 | 657.53  | 2214.44 | 663.28  | 2214.84 | 684.32  | 2214.92 | 693.77  | 2214.82 |
| 703.07  | 2214.87 | 731.45  | 2214.86 | 745.54  | 2214.62 | 757.04  | 2214.86 | 761.17  | 2214.94 |
| 761.72  | 2215.3  | 762.59  | 2215.88 | 763.2   | 2215.86 | 766.31  | 2215.78 | 766.86  | 2215.33 |
| 767.46  | 2214.82 | 773.65  | 2214.88 | 776.57  | 2214.93 | 785.66  | 2215.1  | 786.92  | 2216.67 |
| 788.14  | 2218.15 | 790.89  | 2218.12 | 804.74  | 2217.89 | 811.88  | 2217.8  | 819.21  | 2217.8  |
| 861.07  | 2218.16 | 869.76  | 2218.12 | 879.62  | 2217.7  | 883.77  | 2217.55 | 889.54  | 2216.49 |
| 890.7   | 2216.21 | 894.46  | 2215.91 | 894.55  | 2215.9  | 894.64  | 2215.9  | 895.22  | 2215.89 |
| 919.8   | 2215.83 | 925.09  | 2217.1  | 928.23  | 2217.91 | 930.48  | 2218.17 | 931.28  | 2218.21 |
| 933.92  | 2218.22 | 952.99  | 2218.67 | 982.05  | 2218.88 | 1006.71 | 2218.6  | 1022.48 | 2218.36 |
| 1022.76 | 2218.35 | 1028.88 | 2218.27 | 1041.49 | 2218.76 | 1056.15 | 2219.51 | 1057.55 | 2219.62 |
| 1067.19 | 2219.64 | 1089.16 | 2220.09 | 1120.84 | 2219.89 | 1124.77 | 2219.86 | 1125    | 2219.84 |
| 1126.27 | 2219.81 | 1133.69 | 2219.49 | 1136.31 | 2219.5  | 1146.35 | 2219.6  | 1147.08 | 2219.62 |
| 1161.4  | 2219.93 | 1162.35 | 2219.98 | 1186.81 | 2219.79 | 1215.36 | 2219.94 | 1228.63 | 2219.89 |
| 1243.92 | 2219.91 | 1246.99 | 2219.91 | 1258.18 | 2219.58 | 1265.06 | 2218.96 | 1290.31 | 2219.41 |
| 1290.98 | 2219.43 | 1292.56 | 2219.55 | 1314.7  | 2221.42 | 1315.26 | 2221.42 | 1322.84 | 2221.38 |
| 1379.03 | 2221.4  | 1380.73 | 2221.41 | 1382.26 | 2221.41 | 1385.66 | 2221.4  | 1396.71 | 2221.33 |
| 1397.35 | 2221.5  | 1399.58 | 2222.11 | 1404.53 | 2221.93 | 1406.68 | 2221.84 | 1409.53 | 2221.71 |
| 1422.56 | 2221.18 | 1433.47 | 2221.09 | 1452.55 | 2220.99 | 1469.87 | 2222.44 | 1471.1  | 2222.54 |
| 1472.47 | 2222.61 | 1483.84 | 2222.79 | 1489.3  | 2222.8  | 1517.03 | 2222.65 | 1526.93 | 2222.57 |
| 1529.8  | 2222.42 | 1537.54 | 2223.53 | 1540.06 | 2223.95 | 1545.28 | 2223.92 | 1545.58 | 2223.92 |
| 1547.44 | 2223.9  | 1567.53 | 2223.64 | 1570.43 | 2223.61 | 1572.75 | 2223.6  | 1574.18 | 2223.58 |
| 1599.54 | 2223.17 | 1601.31 | 2223.12 | 1613.03 | 2222.73 | 1614.52 | 2222.7  | 1627.04 | 2221.68 |
| 1653.69 | 2221.75 | 1657.31 | 2221.75 | 1660.93 | 2222.03 | 1674.36 | 2223.12 | 1677.65 | 2222.94 |
| 1697.06 | 2223    | 1718.62 | 2222.92 | 1726.18 | 2222.97 | 1733.8  | 2222.96 | 1741.09 | 2222.97 |
| 1742.28 | 2223.46 | 1743.49 | 2224.05 | 1748.23 | 2224.28 | 1748.39 | 2224.29 | 1749.79 | 2224.28 |
| 1767.72 | 2224.03 | 1777.87 | 2223.84 | 1807.75 | 2223.83 | 1810.22 | 2223.74 | 1813.95 | 2223.54 |
| 1816.76 | 2223.44 |         |         |         |         |         |         |         |         |

Manning's n Values num= 3

| Sta | n Val | Sta    | n Val |
|-----|-------|--------|-------|
| 0   | .02   | 186.59 | .03   |
|     |       | 288.1  | .04   |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

| Left   | Right | Left   | Channel | Right  | Coeff | Contr. | Expan. |
|--------|-------|--------|---------|--------|-------|--------|--------|
| 186.59 | 288.1 | 146.39 | 146.39  | 146.39 | .1    | .3     |        |

Ineffective Flow num= 4

| Sta L   | Sta R   | Elev     | Permanent |
|---------|---------|----------|-----------|
| 0       | 99      | 2215.82  | F         |
| 323     | 791.94  | 2218.099 | F         |
| 796.78  | 1395.99 | 2221.331 | F         |
| 1458.28 | 1816.76 | 2223.443 | F         |

## CROSS SECTION

RIVER: Rancho  
REACH: lower RS: 11200

## INPUT

Description: Just north of Decatur, S of Peak SD  
Station Elevation Data num= 337

| Sta    | Elev    | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    |
|--------|---------|--------|---------|--------|---------|--------|---------|--------|---------|
| 0      | 2207.47 | 1.02   | 2207.48 | 1.68   | 2207.5  | 3.53   | 2207.54 | 5.8    | 2207.57 |
| 5.99   | 2207.57 | 13.41  | 2207.73 | 23.7   | 2207.93 | 26.31  | 2207.96 | 31.22  | 2207.95 |
| 32.46  | 2207.95 | 35.86  | 2207.99 | 36.89  | 2208    | 37.29  | 2208    | 42.7   | 2208.12 |
| 48.56  | 2209.17 | 49.9   | 2209.42 | 50.67  | 2209.36 | 50.78  | 2209.35 | 51.46  | 2209.4  |
| 54.57  | 2209.62 | 57.98  | 2209.55 | 62.63  | 2209.47 | 69.7   | 2209.59 | 73.95  | 2209.48 |
| 81.91  | 2209.25 | 82.16  | 2209.24 | 119.94 | 2210.08 | 123.59 | 2210.1  | 130.39 | 2210.12 |
| 153.77 | 2209.72 | 185.44 | 2209.3  | 186.38 | 2209.28 | 186.91 | 2209.28 | 187.5  | 2209.29 |
| 191.63 | 2209.38 | 192.48 | 2209.4  | 194.1  | 2209.42 | 195.49 | 2209.45 | 196.95 | 2209.43 |
| 198.47 | 2209.42 | 203.22 | 2209.2  | 208.39 | 2208.98 | 212.46 | 2208.77 | 213.96 | 2208.75 |
| 218.57 | 2208.72 | 231.36 | 2208.47 | 236.95 | 2208.56 | 237.42 | 2208.57 | 242.32 | 2208.57 |
| 245.57 | 2208.73 | 255.21 | 2209.13 | 256.77 | 2209.18 | 258.11 | 2209.32 | 259.47 | 2209.48 |
| 264.3  | 2209.99 | 265.23 | 2210.12 | 265.81 | 2210.1  | 268.9  | 2209.96 | 269.26 | 2209.94 |
| 271.84 | 2209.9  | 273.61 | 2205.74 | 273.69 | 2205.53 | 274.05 | 2205.52 | 274.3  | 2205.52 |
| 294.27 | 2205    | 294.46 | 2205    | 295.6  | 2204.96 | 295.97 | 2204.95 | 296.96 | 2204.93 |
| 297.65 | 2204.91 | 301.53 | 2208.39 | 306.23 | 2212.79 | 308.25 | 2212.82 | 308.48 | 2212.83 |
| 309.05 | 2212.84 | 309.91 | 2212.84 | 319.13 | 2212.99 | 325.63 | 2213.52 | 328.64 | 2213.7  |
| 330.84 | 2213.9  | 334.89 | 2214.19 | 336.78 | 2214.34 | 336.88 | 2214.34 | 339.3  | 2214.46 |
| 340.38 | 2214.46 | 342    | 2214.44 | 344.54 | 2214.47 | 361.2  | 2214.59 | 372.79 | 2214.62 |
| 385.31 | 2214.55 | 387.62 | 2214.54 | 393.13 | 2214.56 | 394.58 | 2214.62 | 395.53 | 2214.62 |
| 396.83 | 2214.63 | 397.17 | 2214.63 | 403.68 | 2214.74 | 404.88 | 2214.77 | 411.73 | 2214.86 |
| 420.52 | 2214.91 | 435.44 | 2214.91 | 440.86 | 2214.9  | 441.49 | 2214.89 | 446.3  | 2214.83 |
| 449.51 | 2214.84 | 450.12 | 2214.79 | 452.2  | 2214.76 | 452.36 | 2214.75 | 455.04 | 2214.68 |
| 455.54 | 2214.66 | 457.65 | 2214.8  | 463.92 | 2214.78 | 466.62 | 2214.93 | 489.08 | 2214.85 |
| 497.2  | 2214.85 | 503.62 | 2214.78 | 503.98 | 2214.77 | 505.64 | 2214.75 | 508.66 | 2214.73 |
| 512.81 | 2214.66 | 513.87 | 2214.64 | 521.15 | 2214.49 | 523.49 | 2214.45 | 529.26 | 2214.13 |
| 530.44 | 2214.05 | 537.85 | 2213.8  | 552.12 | 2213.82 | 560.79 | 2213.7  | 561.75 | 2213.68 |
| 568.12 | 2213.56 | 568.85 | 2213.55 | 582.65 | 2213.52 | 584.06 | 2213.53 | 585.64 | 2213.52 |
| 588.75 | 2213.51 | 593.02 | 2213.44 | 598.16 | 2213.44 | 600.35 | 2213.47 | 605.29 | 2213.47 |
| 609.29 | 2213.54 | 610.19 | 2213.55 | 611.98 | 2213.56 | 622.45 | 2213.6  | 633.19 | 2213.61 |
| 634.11 | 2213.62 | 655.54 | 2213.66 | 656.11 | 2213.65 | 656.94 | 2213.67 | 658.89 | 2213.68 |
| 663.6  | 2213.95 | 664.51 | 2214    | 685.08 | 2214.03 | 694.32 | 2213.94 | 703.41 | 2213.96 |
| 717.27 | 2213.94 | 717.7  | 2213.94 | 719.58 | 2213.92 | 731.16 | 2213.83 | 740.75 | 2213.61 |
| 744.48 | 2213.5  | 744.93 | 2213.49 | 751.44 | 2213.5  | 756.18 | 2213.52 | 756.45 | 2213.52 |
| 760.21 | 2213.58 | 760.75 | 2213.88 | 761.26 | 2214.16 | 761.6  | 2214.36 | 762.2  | 2214.34 |
| 765.24 | 2214.28 | 765.78 | 2213.9  | 766.36 | 2213.47 | 772.08 | 2213.52 | 772.42 | 2213.52 |
| 775.27 | 2213.56 | 784.16 | 2213.7  | 785.39 | 2215.01 | 786.58 | 2216.24 | 789.27 | 2216.22 |
| 793.39 | 2216.16 | 794.45 | 2216.14 | 801.28 | 2215.98 | 802.81 | 2215.96 | 809.79 | 2215.9  |
| 816.96 | 2215.91 | 848.04 | 2216.21 | 848.65 | 2216.22 | 851.64 | 2216.28 | 857.88 | 2216.32 |

|         |         |         |         |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 864.54  | 2216.28 | 866.38  | 2216.28 | 876.02  | 2215.94 | 880.08  | 2215.82 | 885.72  | 2214.94 |
| 886.85  | 2214.71 | 888.41  | 2214.61 | 890.53  | 2214.46 | 890.62  | 2214.45 | 890.7   | 2214.45 |
| 891.27  | 2214.44 | 897.4   | 2214.4  | 915.3   | 2214.31 | 920.47  | 2215.35 | 923.54  | 2216.02 |
| 925.74  | 2216.23 | 926.52  | 2216.26 | 929.11  | 2216.26 | 938.01  | 2216.41 | 941.41  | 2216.49 |
| 947.75  | 2216.62 | 976.16  | 2216.87 | 980.54  | 2216.84 | 981.33  | 2216.83 | 1000.27 | 2216.72 |
| 1001.7  | 2216.7  | 1015.69 | 2216.54 | 1015.96 | 2216.53 | 1021.94 | 2216.48 | 1034.27 | 2216.89 |
| 1042.79 | 2217.26 | 1048.6  | 2217.53 | 1049.97 | 2217.63 | 1059.4  | 2217.68 | 1065.13 | 2217.8  |
| 1080.88 | 2218.1  | 1115.69 | 2218.02 | 1115.92 | 2218    | 1117.16 | 2217.98 | 1124.41 | 2217.73 |
| 1126.97 | 2217.75 | 1136.79 | 2217.85 | 1137.5  | 2217.86 | 1151.5  | 2218.13 | 1152.43 | 2218.18 |
| 1160.53 | 2218.13 | 1176.35 | 2217.99 | 1177.41 | 2217.99 | 1191.18 | 2218.01 | 1204.26 | 2218.09 |
| 1217.23 | 2218.06 | 1232.18 | 2218.1  | 1235.18 | 2218.1  | 1246.12 | 2217.84 | 1252.85 | 2217.33 |
| 1273.83 | 2217.68 | 1275.15 | 2217.7  | 1276.19 | 2217.72 | 1277.53 | 2217.75 | 1278.19 | 2217.77 |
| 1279.73 | 2217.88 | 1301.38 | 2219.55 | 1301.93 | 2219.55 | 1304.79 | 2219.56 | 1307.54 | 2219.53 |
| 1332.92 | 2219.53 | 1342.42 | 2219.51 | 1343.36 | 2219.51 | 1364.27 | 2219.46 | 1367.43 | 2219.46 |
| 1374.86 | 2219.41 | 1378.53 | 2219.39 | 1379.21 | 2219.38 | 1379.75 | 2219.38 | 1380.17 | 2219.37 |
| 1380.54 | 2219.37 | 1381.56 | 2219.36 | 1381.83 | 2219.42 | 1382.18 | 2219.5  | 1384.36 | 2220.01 |
| 1389.2  | 2219.86 | 1391.3  | 2219.78 | 1394.09 | 2219.68 | 1406.83 | 2219.24 | 1417.5  | 2219.16 |
| 1436.15 | 2219.08 | 1453.08 | 2220.29 | 1454.29 | 2220.38 | 1455.24 | 2220.42 | 1455.62 | 2220.43 |
| 1457.38 | 2220.46 | 1457.96 | 2220.46 | 1461.42 | 2220.52 | 1462.04 | 2220.52 | 1466.74 | 2220.58 |
| 1472.08 | 2220.58 | 1478.03 | 2220.55 | 1481.16 | 2220.54 | 1484.79 | 2220.51 | 1497.19 | 2220.45 |
| 1499.19 | 2220.45 | 1507.31 | 2220.41 | 1508.87 | 2220.41 | 1511.67 | 2220.29 | 1519.24 | 2221.25 |
| 1521.7  | 2221.61 | 1527.1  | 2221.61 | 1528.92 | 2221.6  | 1548.56 | 2221.47 | 1549.64 | 2221.46 |
| 1551.4  | 2221.44 | 1553.66 | 2221.43 | 1555.06 | 2221.42 | 1557.83 | 2221.38 | 1566.54 | 2221.21 |
| 1579.86 | 2221.04 | 1581.59 | 2221    | 1593.04 | 2220.69 | 1594.5  | 2220.67 | 1606.74 | 2219.83 |
| 1632.8  | 2219.92 | 1636.34 | 2219.92 | 1639.87 | 2220.16 | 1647.01 | 2220.66 | 1653    | 2221.05 |
| 1656.22 | 2220.88 | 1662.34 | 2220.86 | 1673.43 | 2221.01 | 1678.06 | 2221.01 | 1695.59 | 2220.97 |
| 1696.28 | 2220.96 | 1703.67 | 2221    | 1708.86 | 2220.99 | 1711.12 | 2220.98 | 1718.24 | 2220.99 |
| 1719.41 | 2221.39 | 1720.59 | 2221.88 | 1725.22 | 2222.07 | 1725.38 | 2222.08 | 1726.75 | 2222.07 |
| 1744.28 | 2221.85 | 1754.2  | 2221.7  | 1783.41 | 2221.71 | 1785.83 | 2221.64 | 1789.48 | 2221.47 |
| 1790.71 | 2221.44 | 1792.22 | 2221.39 |         |         |         |         |         |         |

Manning's n Values num= 3

| Sta | n Val | Sta    | n Val | Sta    | n Val |
|-----|-------|--------|-------|--------|-------|
| 0   | .02   | 271.84 | .03   | 306.23 | .04   |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

| Left   | Right  | Left   | Channel | Right  | Coeff | Contr. | Expan. |
|--------|--------|--------|---------|--------|-------|--------|--------|
| 271.84 | 306.23 | 897.89 | 897.89  | 897.89 | .1    | .3     |        |

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|-------|-------|------|-----------|
| 0     | 62.63 | 2216 | T         |

## CROSS SECTION

RIVER: Rancho  
REACH: lower RS: 10302.11

## INPUT

## Description:

| Station | Elevation | Data    | num=    | 170     |         |         |         |         |         |
|---------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|
| Sta     | Elev      | Sta     | Elev    | Sta     | Elev    | Sta     | Elev    | Sta     | Elev    |
| 0       | 2200.35   | 3.87    | 2200.42 | 8.15    | 2200.47 | 9.87    | 2200.44 | 13.38   | 2200.37 |
| 13.83   | 2200.36   | 30.96   | 2200.49 | 60.73   | 2200.79 | 74.92   | 2200.46 | 82.77   | 2200.48 |
| 110.69  | 2200.66   | 117.23  | 2200.66 | 118.79  | 2201.15 | 125.97  | 2203.5  | 133.83  | 2204.17 |
| 144.57  | 2205.24   | 144.66  | 2205.25 | 181.39  | 2206.41 | 203.56  | 2206.06 | 245     | 2205.21 |
| 246.33  | 2205.18   | 248.16  | 2205.14 | 251.81  | 2205.48 | 255.23  | 2205.81 | 256.53  | 2205.64 |
| 262.08  | 2205.25   | 271.59  | 2204.96 | 284.31  | 2204.75 | 292.37  | 2204.57 | 296.07  | 2203.96 |
| 296.71  | 2203.87   | 298.14  | 2204.14 | 308.13  | 2205.73 | 313.24  | 2206.06 | 317.52  | 2206.27 |
| 320.26  | 2206.37   | 325.04  | 2206.52 | 342.9   | 2206.51 | 345.11  | 2206.46 | 355.11  | 2206.65 |
| 355.31  | 2206.65   | 355.82  | 2206.66 | 373.17  | 2206.75 | 380.38  | 2208.21 | 380.47  | 2208.23 |
| 383.57  | 2208.24   | 402.01  | 2208.25 | 412.28  | 2208.19 | 416.06  | 2207.92 | 419.21  | 2207.75 |
| 423.37  | 2207.46   | 425.41  | 2207.35 | 430.29  | 2207.35 | 431.58  | 2207.63 | 432.42  | 2207.65 |
| 433.57  | 2207.67   | 433.87  | 2207.62 | 434.39  | 2207.68 | 439.64  | 2208.14 | 440.7   | 2208.3  |
| 446.77  | 2208.67   | 454.55  | 2208.92 | 457.8   | 2208.94 | 462.66  | 2208.94 | 464.19  | 2208.97 |
| 467.77  | 2209      | 473.13  | 2208.95 | 482.76  | 2209.05 | 485.13  | 2209.12 | 501.84  | 2209.22 |
| 515.28  | 2209.41   | 515.84  | 2209.43 | 528.16  | 2209.79 | 536.3   | 2209.7  | 537.24  | 2209.66 |
| 543.69  | 2209.44   | 562.82  | 2209.77 | 578.8   | 2209.99 | 582.4   | 2210    | 585.29  | 2210.03 |
| 598.16  | 2210.19   | 599.41  | 2210.25 | 600.81  | 2210.25 | 608.82  | 2210.2  | 610.49  | 2210.21 |
| 622.55  | 2210.34   | 624.14  | 2210.37 | 642.93  | 2210.04 | 643.74  | 2210.04 | 669.86  | 2209.82 |
| 710.66  | 2209.37   | 717.4   | 2209.31 | 717.78  | 2209.3  | 719.45  | 2209.22 | 738.2   | 2208.19 |
| 741.5   | 2207.86   | 747.67  | 2207.22 | 752.1   | 2206.8  | 756.36  | 2206.77 | 765.95  | 2206.72 |
| 784.82  | 2206.71   | 785.76  | 2206.66 | 791.81  | 2206.27 | 833.23  | 2206.88 | 833.77  | 2206.92 |
| 836.42  | 2207.15   | 847.84  | 2207.05 | 848.35  | 2207.04 | 868.99  | 2207.23 | 876.95  | 2207.02 |
| 912.92  | 2206.3    | 915.93  | 2206.35 | 919.75  | 2206.36 | 926.99  | 2206.49 | 950.59  | 2206.87 |
| 951.29  | 2206.88   | 952.8   | 2206.95 | 969.33  | 2207.33 | 992.77  | 2207.57 | 1005.73 | 2207.54 |
| 1025.52 | 2207.99   | 1032.79 | 2208.04 | 1063.49 | 2208.67 | 1084.86 | 2209.06 | 1110.02 | 2209.19 |
| 1124.97 | 2208.96   | 1137.17 | 2208.72 | 1210.37 | 2209.35 | 1211.54 | 2209.35 | 1212.46 | 2209.4  |
| 1237.8  | 2210.32   | 1240.23 | 2210.24 | 1243.1  | 2210.29 | 1257.82 | 2210.24 | 1262.71 | 2210.21 |
| 1271.13 | 2210.12   | 1271.96 | 2210.08 | 1299.86 | 2209.59 | 1301.7  | 2209.61 | 1303.11 | 2209.58 |
| 1303.71 | 2209.57   | 1304.19 | 2209.55 | 1304.56 | 2209.54 | 1304.89 | 2209.53 | 1306.03 | 2209.5  |
| 1371.06 | 2209.56   | 1372.95 | 2209.55 | 1373.47 | 2209.54 | 1376.53 | 2209.59 | 1377.08 | 2209.54 |
| 1391.24 | 2209.48   | 1394.02 | 2209.5  | 1397.23 | 2209.42 | 1408.21 | 2209.39 | 1417.18 | 2209.56 |
| 1454.67 | 2210.62   | 1461.93 | 2210.58 | 1469.64 | 2210.3  | 1486.95 | 2210.46 | 1518.19 | 2210.65 |
| 1540.92 | 2210.87   | 1554.5  | 2210.37 | 1564.32 | 2211.08 | 1568.42 | 2211.09 | 1583.95 | 2211.18 |
| 1586.34 | 2211.14   | 1595.7  | 2211.11 | 1626.32 | 2210.93 | 1668.2  | 2211.15 | 1669.54 | 2211.16 |

Manning's n Values num= 3

| Sta | n Val | Sta    | n Val | Sta    | n Val |
|-----|-------|--------|-------|--------|-------|
| 0   | .02   | 256.53 | .03   | 313.24 | .04   |

|                  |         |         |           |        |         |        |       |        |        |
|------------------|---------|---------|-----------|--------|---------|--------|-------|--------|--------|
| Bank Sta:        | Left    | Right   | Lengths:  | Left   | Channel | Right  | Coeff | Contr. | Expan. |
|                  | 256.53  | 313.24  |           | 426.91 | 426.91  | 426.91 |       | .1     | .3     |
| Ineffective Flow | num=    |         | 3         |        |         |        |       |        |        |
| Sta L            | Sta R   | Elev    | Permanent |        |         |        |       |        |        |
| 0                | 181     | 2208.36 | F         |        |         |        |       |        |        |
| 323.25           | 535.76  | 2209.70 | F         |        |         |        |       |        |        |
| 946.16           | 1669.54 | 2211.15 | F         |        |         |        |       |        |        |

## CROSS SECTION

RIVER: Rancho  
REACH: lower RS: 9875.193

## INPUT

Description:

|         |           |         |         |         |         |         |         |         |         |     |      |     |      |  |
|---------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|-----|------|-----|------|--|
| Station | Elevation | Data    | num=    | 153     |         |         |         |         |         |     |      |     |      |  |
| Sta     | Elev      | Sta     | Elev    | Sta     | Elev    | Sta     | Elev    | Sta     | Elev    | Sta | Elev | Sta | Elev |  |
| 0       | 2201.65   | 3.19    | 2202.06 | 3.79    | 2202.1  | 5.59    | 2202.17 | 6.72    | 2202.19 |     |      |     |      |  |
| 10.21   | 2202.22   | 32.04   | 2203.08 | 41.18   | 2202.92 | 48.53   | 2202.88 | 62.77   | 2202.41 |     |      |     |      |  |
| 64.55   | 2202.37   | 64.75   | 2202.36 | 64.98   | 2202.35 | 65.24   | 2202.34 | 75.05   | 2202.34 |     |      |     |      |  |
| 75.97   | 2202.28   | 82.08   | 2201.83 | 82.45   | 2201.81 | 82.64   | 2201.78 | 86.06   | 2201.78 |     |      |     |      |  |
| 91.93   | 2201.67   | 92.16   | 2201.68 | 92.75   | 2201.69 | 93.09   | 2201.7  | 99.74   | 2201.6  |     |      |     |      |  |
| 100.78  | 2201.61   | 102.86  | 2201.61 | 105.72  | 2201.61 | 107.79  | 2201.57 | 116.27  | 2201.55 |     |      |     |      |  |
| 120.9   | 2201.49   | 123.59  | 2201.46 | 126.37  | 2201.41 | 128.2   | 2201.38 | 157.39  | 2201.09 |     |      |     |      |  |
| 159.25  | 2201.04   | 160.54  | 2201.09 | 169.72  | 2201.46 | 177.62  | 2201.77 | 182.9   | 2201.99 |     |      |     |      |  |
| 186.61  | 2202.14   | 189.33  | 2202.26 | 205.21  | 2202.87 | 206.96  | 2202.86 | 213.08  | 2202.91 |     |      |     |      |  |
| 232.67  | 2202.61   | 270.8   | 2201.92 | 270.89  | 2201.91 | 280.59  | 2201.99 | 283.58  | 2202.01 |     |      |     |      |  |
| 284.91  | 2202      | 290.14  | 2201.81 | 293.01  | 2201.78 | 294.05  | 2201.75 | 294.38  | 2201.75 |     |      |     |      |  |
| 296.12  | 2201.69   | 297.15  | 2201.71 | 301.43  | 2201.68 | 302.74  | 2201.67 | 303.74  | 2201.66 |     |      |     |      |  |
| 321.19  | 2201.46   | 322.02  | 2201.48 | 334.73  | 2201.39 | 335.55  | 2201.39 | 347.79  | 2201.52 |     |      |     |      |  |
| 350.58  | 2201.55   | 351.39  | 2201.57 | 362.78  | 2201.89 | 365.56  | 2201.95 | 366.41  | 2201.94 |     |      |     |      |  |
| 381.54  | 2201.71   | 387.69  | 2201.63 | 393.95  | 2201.63 | 401.47  | 2201.63 | 406.17  | 2201.63 |     |      |     |      |  |
| 408.33  | 2201.63   | 410.68  | 2201.66 | 435.65  | 2201.67 | 439.32  | 2201.69 | 443.4   | 2201.73 |     |      |     |      |  |
| 445.48  | 2201.72   | 447.9   | 2201.73 | 465.74  | 2201.8  | 473.4   | 2201.75 | 475.19  | 2201.74 |     |      |     |      |  |
| 485.57  | 2201.93   | 489.96  | 2202.05 | 491.48  | 2202.13 | 493.37  | 2202.22 | 495.93  | 2202.32 |     |      |     |      |  |
| 505.36  | 2202.68   | 508.09  | 2202.88 | 508.53  | 2202.91 | 509.12  | 2202.92 | 515.42  | 2203.14 |     |      |     |      |  |
| 528.17  | 2203.39   | 549.57  | 2203.72 | 553.7   | 2203.78 | 555.15  | 2203.82 | 567.48  | 2203.93 |     |      |     |      |  |
| 577.78  | 2204.16   | 591.22  | 2204.29 | 602.23  | 2204.34 | 604     | 2204.35 | 608.15  | 2204.37 |     |      |     |      |  |
| 630.28  | 2204.35   | 647.66  | 2204.5  | 656.73  | 2204.54 | 671.85  | 2204.52 | 674.6   | 2204.51 |     |      |     |      |  |
| 678.15  | 2204.42   | 693.58  | 2204.29 | 710.91  | 2204.24 | 723.52  | 2204.33 | 731.73  | 2204.31 |     |      |     |      |  |
| 740.66  | 2204.41   | 762.9   | 2204.79 | 766.62  | 2204.81 | 768.24  | 2204.82 | 769.58  | 2204.82 |     |      |     |      |  |
| 771.85  | 2204.83   | 773.97  | 2204.86 | 779.57  | 2204.86 | 815.75  | 2204.75 | 816.75  | 2204.74 |     |      |     |      |  |
| 817.34  | 2204.73   | 843.07  | 2204.64 | 853.89  | 2204.52 | 863.22  | 2204.62 | 872.6   | 2204.96 |     |      |     |      |  |
| 891.31  | 2204.94   | 916.1   | 2204.8  | 921.64  | 2204.93 | 927.44  | 2204.8  | 931.18  | 2204.68 |     |      |     |      |  |
| 932.38  | 2204.66   | 946.66  | 2204.31 | 972.8   | 2203.64 | 975.4   | 2203.48 | 984.78  | 2203.27 |     |      |     |      |  |
| 1004.8  | 2203.37   | 1007.38 | 2203.37 | 1010.82 | 2203.36 | 1029.37 | 2203.77 | 1038.4  | 2203.86 |     |      |     |      |  |
| 1065.38 | 2203.37   | 1071.41 | 2203.37 | 1074.91 | 2203.64 | 1075.41 | 2203.72 | 1081.89 | 2203.76 |     |      |     |      |  |
| 1084.33 | 2203.76   | 1086.32 | 2203.9  | 1090.76 | 2204.27 |         |         |         |         |     |      |     |      |  |

|                    |       |        |       |        |       |     |       |  |
|--------------------|-------|--------|-------|--------|-------|-----|-------|--|
| Manning's n Values | num=  | 3      |       |        |       |     |       |  |
| Sta                | n Val | Sta    | n Val | Sta    | n Val | Sta | n Val |  |
| 0                  | .02   | 365.56 | .03   | 495.93 | .04   |     |       |  |

|                  |         |         |           |        |         |        |       |        |        |
|------------------|---------|---------|-----------|--------|---------|--------|-------|--------|--------|
| Bank Sta:        | Left    | Right   | Lengths:  | Left   | Channel | Right  | Coeff | Contr. | Expan. |
|                  | 365.56  | 495.93  |           | 149.31 | 144.89  | 141.18 |       | .1     | .3     |
| Ineffective Flow | num=    |         | 2         |        |         |        |       |        |        |
| Sta L            | Sta R   | Elev    | Permanent |        |         |        |       |        |        |
| 0                | 200     | 2204    | F         |        |         |        |       |        |        |
| 1067.88          | 1090.76 | 2204.26 | F         |        |         |        |       |        |        |

## CROSS SECTION

RIVER: Rancho  
REACH: lower RS: 9730.641

## INPUT

Description: 63 ft S of Drive C of Rancho Air Cntr. 48" SD to 12x8 RCB

|         |           |        |         |        |         |        |         |        |         |     |      |     |      |  |
|---------|-----------|--------|---------|--------|---------|--------|---------|--------|---------|-----|------|-----|------|--|
| Station | Elevation | Data   | num=    | 181    |         |        |         |        |         |     |      |     |      |  |
| Sta     | Elev      | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    | Sta | Elev | Sta | Elev |  |
| 0       | 2198.45   | 5.2    | 2199.14 | 5.52   | 2199.19 | 7.27   | 2199.39 | 15.81  | 2200.37 |     |      |     |      |  |
| 18.64   | 2200.67   | 43.44  | 2201.08 | 43.63  | 2201.08 | 43.8   | 2201.08 | 73.18  | 2200.66 |     |      |     |      |  |
| 82.35   | 2200.45   | 86.38  | 2200.42 | 91.42  | 2200.4  | 107.15 | 2200.24 | 117.79 | 2200.33 |     |      |     |      |  |
| 124.12  | 2200.18   | 133.11 | 2199.92 | 134.96 | 2199.85 | 136.65 | 2199.89 | 136.68 | 2199.9  |     |      |     |      |  |
| 142.79  | 2200.07   | 197.97 | 2201.67 | 199.75 | 2201.7  | 199.84 | 2201.71 | 201.76 | 2201.74 |     |      |     |      |  |
| 201.83  | 2201.74   | 203.83 | 2201.76 | 205.81 | 2201.77 | 205.92 | 2201.77 | 207.11 | 2201.78 |     |      |     |      |  |
| 207.35  | 2201.78   | 207.79 | 2201.78 | 208.34 | 2201.78 | 208.65 | 2201.78 | 209    | 2201.78 |     |      |     |      |  |
| 210.25  | 2201.78   | 210.72 | 2201.78 | 211.18 | 2201.78 | 211.35 | 2201.77 | 212.02 | 2201.77 |     |      |     |      |  |
| 212.06  | 2201.77   | 212.1  | 2201.77 | 214.78 | 2201.74 | 215.11 | 2201.74 | 218.17 | 2201.7  |     |      |     |      |  |
| 219.05  | 2201.69   | 221.95 | 2201.61 | 226.27 | 2201.55 | 244.65 | 2201.19 | 259.17 | 2200.89 |     |      |     |      |  |
| 260.52  | 2200.86   | 263.31 | 2201.02 | 265.44 | 2201.03 | 273.52 | 2201.08 | 275.59 | 2201.15 |     |      |     |      |  |
| 284.04  | 2201.19   | 286.02 | 2201.13 | 286.27 | 2201.12 | 290.85 | 2201.01 | 291.84 | 2200.97 |     |      |     |      |  |
| 292.83  | 2200.94   | 293.02 | 2200.93 | 301.3  | 2200.68 | 319.33 | 2200.3  | 320.69 | 2200.29 |     |      |     |      |  |
| 320.89  | 2200.29   | 337    | 2200.22 | 339.27 | 2200.21 | 344.6  | 2200.17 | 346.66 | 2200.14 |     |      |     |      |  |
| 354.52  | 2200.13   | 356.54 | 2200.17 | 365.94 | 2200.38 | 373.52 | 2200.42 | 377.81 | 2200.46 |     |      |     |      |  |
| 382.45  | 2200.51   | 387.31 | 2200.52 | 392.45 | 2200.51 | 396.37 | 2200.51 | 399.27 | 2200.52 |     |      |     |      |  |
| 405.24  | 2200.49   | 409.23 | 2200.52 | 420.13 | 2200.29 | 440.25 | 2200.44 | 448.29 | 2200.45 |     |      |     |      |  |

|         |         |        |         |        |         |        |         |        |         |
|---------|---------|--------|---------|--------|---------|--------|---------|--------|---------|
| 448.99  | 2200.45 | 450.33 | 2200.46 | 452.42 | 2200.68 | 454.1  | 2200.76 | 456.95 | 2200.89 |
| 464.37  | 2201.68 | 469.93 | 2202.4  | 473.38 | 2202.56 | 481.24 | 2202.85 | 491.44 | 2203.22 |
| 507.76  | 2203.12 | 514.72 | 2203.19 | 518.74 | 2203.2  | 522.57 | 2203.21 | 535.5  | 2203.45 |
| 556.05  | 2203.57 | 560.86 | 2203.75 | 563.34 | 2203.84 | 569.12 | 2203.82 | 571.88 | 2203.81 |
| 574.72  | 2203.8  | 579    | 2203.8  | 581.31 | 2203.79 | 586.44 | 2203.77 | 590.45 | 2203.71 |
| 594.49  | 2203.65 | 599.3  | 2203.6  | 602.81 | 2203.5  | 605.04 | 2203.44 | 614.17 | 2203.33 |
| 616.78  | 2203.24 | 622.42 | 2203.09 | 626.35 | 2203.06 | 635.12 | 2202.96 | 648.15 | 2203.04 |
| 650.09  | 2203.03 | 651.02 | 2203.03 | 662.04 | 2203    | 667.28 | 2202.99 | 677.67 | 2203    |
| 687.29  | 2203.05 | 697.02 | 2203.03 | 703.18 | 2203.09 | 705.55 | 2203.14 | 711.38 | 2203.21 |
| 736.68  | 2203.43 | 740.16 | 2203.49 | 759.2  | 2203.5  | 768.82 | 2203.27 | 774.03 | 2203.14 |
| 784.52  | 2203.05 | 792.05 | 2202.95 | 803.69 | 2202.63 | 811.01 | 2202.46 | 811.44 | 2202.45 |
| 811.64  | 2202.45 | 819.42 | 2202.46 | 860.42 | 2202.52 | 860.84 | 2202.68 | 862.05 | 2203.07 |
| 864.98  | 2203.25 | 866.15 | 2203.3  | 868.1  | 2203.44 | 875.1  | 2203.46 | 877.09 | 2203.43 |
| 880.03  | 2203.45 | 886.82 | 2203.47 | 887.39 | 2203.46 | 893.58 | 2203.6  | 895.21 | 2203.62 |
| 895.86  | 2203.62 | 897.61 | 2203.65 | 898.55 | 2203.67 | 899.74 | 2203.7  | 901.5  | 2203.75 |
| 905.11  | 2203.83 | 911.12 | 2203.98 | 912.72 | 2204.02 | 923.42 | 2204.3  | 926.95 | 2204.37 |
| 926.98  | 2204.37 | 928.08 | 2204.4  | 930.03 | 2204.44 | 932.25 | 2204.48 | 941.08 | 2204.51 |
| 943.75  | 2204.77 | 944.11 | 2204.67 | 950.46 | 2204.77 | 962.04 | 2204.96 | 963.54 | 2205.22 |
| 964.81  | 2205.45 | 967.7  | 2205.47 | 980.54 | 2205.1  | 984.55 | 2205.04 | 995.72 | 2205.14 |
| 1000.97 | 2205.15 |        |         |        |         |        |         |        |         |

Manning's n Values

| Sta | n   | Val    | Sta | n   | Val    | Sta | n   | Val |
|-----|-----|--------|-----|-----|--------|-----|-----|-----|
| 0   | .02 | 286.02 |     | .03 | 469.93 |     | .04 |     |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

|        |        |  |        |        |       |    |    |
|--------|--------|--|--------|--------|-------|----|----|
| 286.02 | 469.93 |  | 698.52 | 698.08 | 697.8 | .1 | .3 |
|--------|--------|--|--------|--------|-------|----|----|

Ineffective Flow num= 1

| Sta L | Sta R | Elev | Permanent |
|-------|-------|------|-----------|
| 0     | 203   | 2205 | F         |

## CROSS SECTION

RIVER: Rancho  
REACH: lower RS: 9032.391

## INPUT

## Description:

| Station | Elevation | Data   | num=    | 125    | Station | Elevation | Data    | num=   | 125     |
|---------|-----------|--------|---------|--------|---------|-----------|---------|--------|---------|
| 0       | 2191.87   | 5.4    | 2192.42 | 6.39   | 2192.44 | 8.42      | 2192.49 | 10.05  | 2192.54 |
| 14.42   | 2192.66   | 37.21  | 2193.12 | 41.72  | 2193.22 | 54.65     | 2193.27 | 67.61  | 2193.22 |
| 79.67   | 2193.38   | 88.87  | 2193.21 | 99.64  | 2193.16 | 113.33    | 2192.92 | 122.67 | 2192.56 |
| 135.65  | 2192.67   | 145.24 | 2192.64 | 152.93 | 2193.01 | 157.24    | 2193.22 | 163.08 | 2195.11 |
| 163.21  | 2195.16   | 163.3  | 2195.16 | 166.14 | 2195.3  | 171.46    | 2195.56 | 172.57 | 2195.62 |
| 198.79  | 2196.01   | 208.66 | 2196.15 | 221.19 | 2196.35 | 231.65    | 2196.53 | 243.58 | 2196.34 |
| 256.45  | 2196.1    | 275.33 | 2195.76 | 275.96 | 2195.75 | 281       | 2195.93 | 294.54 | 2196.26 |
| 295.66  | 2196.24   | 296.46 | 2196.28 | 298.09 | 2196.3  | 315.89    | 2196.02 | 330.48 | 2196.07 |
| 348.34  | 2196.27   | 353.78 | 2196.32 | 360.18 | 2196.4  | 360.37    | 2196.4  | 360.53 | 2196.41 |
| 367.45  | 2196.98   | 370.68 | 2197.17 | 372.81 | 2197.29 | 378.28    | 2197.65 | 381.27 | 2197.92 |
| 381.47  | 2197.93   | 386.3  | 2198.15 | 389.05 | 2198.2  | 389.31    | 2198.21 | 392.96 | 2198.23 |
| 393.13  | 2198.23   | 393.14 | 2198.23 | 396.4  | 2198.17 | 396.72    | 2198.16 | 399.84 | 2198.01 |
| 401.02  | 2197.95   | 403.42 | 2197.8  | 404.99 | 2197.75 | 406.38    | 2197.66 | 407.84 | 2197.53 |
| 408.62  | 2197.47   | 409.84 | 2197.34 | 418.84 | 2196.97 | 429.3     | 2197.07 | 432.11 | 2197.03 |
| 437.94  | 2197.07   | 443.78 | 2197.07 | 446.89 | 2197.07 | 458.67    | 2197.73 | 470.68 | 2198.14 |
| 481.65  | 2198.28   | 490.03 | 2198.31 | 493.92 | 2198.38 | 508.36    | 2198.61 | 517.74 | 2198.3  |
| 520.95  | 2198.17   | 526.43 | 2197.95 | 545.15 | 2197.1  | 556.89    | 2196.58 | 558.95 | 2196.57 |
| 560.91  | 2196.56   | 569.65 | 2196.52 | 579.9  | 2196.49 | 587.55    | 2196.58 | 589.25 | 2196.6  |
| 610.84  | 2196.87   | 617.47 | 2196.97 | 634.51 | 2197.2  | 645.34    | 2197.36 | 655.73 | 2197.5  |
| 686.91  | 2197.91   | 689.09 | 2197.94 | 696.89 | 2198.04 | 720.96    | 2198.59 | 729.12 | 2198.75 |
| 729.42  | 2198.76   | 751.4  | 2199.48 | 773.65 | 2199.83 | 774.84    | 2199.83 | 775.4  | 2199.83 |
| 777.17  | 2199.86   | 787.94 | 2199.95 | 795.24 | 2200.04 | 813.22    | 2199.9  | 815.9  | 2199.9  |
| 818.53  | 2199.9    | 820.61 | 2199.92 | 822.11 | 2199.92 | 824.38    | 2199.92 | 825.42 | 2199.92 |
| 835.43  | 2199.83   | 840.08 | 2199.78 | 846.07 | 2199.77 | 846.67    | 2199.82 | 847.04 | 2199.83 |
| 851.55  | 2200.05   | 853.45 | 2200.16 | 862.59 | 2200.26 | 865.38    | 2200.37 | 870.12 | 2200.59 |

Manning's n Values

| Sta | n   | Val | Sta | n   | Val    | Sta | n   | Val |
|-----|-----|-----|-----|-----|--------|-----|-----|-----|
| 0   | .02 | 281 |     | .03 | 389.05 |     | .04 |     |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

|     |        |  |       |       |       |    |    |
|-----|--------|--|-------|-------|-------|----|----|
| 281 | 389.05 |  | 94.56 | 96.88 | 98.74 | .1 | .3 |
|-----|--------|--|-------|-------|-------|----|----|

Ineffective Flow num= 2

| Sta L  | Sta R  | Elev     | Permanent |
|--------|--------|----------|-----------|
| 0      | 233.92 | 2201.12  | F         |
| 814.92 | 870.12 | 2200.595 | F         |

## CROSS SECTION

RIVER: Rancho  
REACH: lower RS: 8935.525

## INPUT

## Description: 53 feet south of Drive L of Rancho Air Center

| Station | Elevation | Data | num=    | 127  | Station | Elevation | Data    | num=  | 127     |
|---------|-----------|------|---------|------|---------|-----------|---------|-------|---------|
| 0       | 2190.62   | 2.29 | 2190.54 | 3.91 | 2190.53 | 22.15     | 2190.98 | 23.55 | 2191.04 |

|         |         |         |         |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 24.07   | 2191.07 | 24.58   | 2191.09 | 28.63   | 2191.14 | 34.3    | 2191.19 | 35.26   | 2191.19 |
| 37.13   | 2191.2  | 51.09   | 2191.42 | 53.79   | 2191.4  | 59.03   | 2191.42 | 62.85   | 2191.52 |
| 64.71   | 2191.6  | 69      | 2191.66 | 72.04   | 2191.7  | 78.75   | 2191.76 | 83.72   | 2191.88 |
| 88.38   | 2191.94 | 91.42   | 2191.98 | 96.06   | 2191.91 | 98.66   | 2191.87 | 103.4   | 2191.75 |
| 107.15  | 2191.63 | 109.34  | 2191.66 | 112.95  | 2191.46 | 113.56  | 2191.45 | 113.69  | 2191.44 |
| 120.79  | 2191.33 | 123.24  | 2191.35 | 126.35  | 2191.37 | 129.12  | 2191.42 | 131.04  | 2191.45 |
| 134.27  | 2191.48 | 138.75  | 2191.66 | 145.58  | 2192.05 | 148.13  | 2192.2  | 151.61  | 2192.27 |
| 156.7   | 2192.47 | 160.08  | 2193.6  | 161.66  | 2194.14 | 162.71  | 2194.22 | 172.27  | 2194.96 |
| 172.83  | 2195    | 206.69  | 2195.35 | 208.92  | 2195.37 | 210.05  | 2195.41 | 232.06  | 2196.01 |
| 267.55  | 2195.22 | 274.57  | 2195.04 | 275.94  | 2195.12 | 278.81  | 2195.3  | 283.1   | 2195.5  |
| 284.88  | 2195.54 | 304.79  | 2195.29 | 313.35  | 2195.24 | 324.24  | 2194.93 | 329     | 2194.85 |
| 330.44  | 2195.01 | 333.59  | 2195.31 | 335.27  | 2195.42 | 356.05  | 2197.27 | 356.67  | 2197.33 |
| 357.5   | 2197.4  | 358.44  | 2197.38 | 386.29  | 2198.13 | 390.79  | 2198.25 | 391.18  | 2198.26 |
| 391.22  | 2198.25 | 391.28  | 2198.25 | 391.35  | 2198.25 | 398.92  | 2198.18 | 401.84  | 2197.99 |
| 414.71  | 2197.5  | 429.26  | 2197.56 | 432.98  | 2197.56 | 436.21  | 2197.68 | 440.43  | 2197.67 |
| 461.77  | 2198.2  | 462.08  | 2198.2  | 462.28  | 2198.2  | 462.85  | 2198.23 | 482.11  | 2198.7  |
| 484.18  | 2198.75 | 505.18  | 2199.28 | 514.96  | 2199.62 | 518.27  | 2199.69 | 529.3   | 2199.8  |
| 535.22  | 2199.86 | 562.3   | 2199.71 | 586.87  | 2199.71 | 602     | 2199.75 | 605.9   | 2199.7  |
| 618.77  | 2199.61 | 631.62  | 2199.55 | 651.16  | 2199.4  | 696.07  | 2198.95 | 714.38  | 2198.95 |
| 787.15  | 2198.57 | 805.62  | 2198.53 | 812.03  | 2198.53 | 820.34  | 2198.62 | 826.38  | 2198.65 |
| 859.63  | 2198.74 | 864.4   | 2198.75 | 877.92  | 2198.79 | 883.85  | 2198.81 | 916.39  | 2199.1  |
| 931.5   | 2199.11 | 938.92  | 2199.17 | 951.37  | 2199.04 | 952.64  | 2199.03 | 954.64  | 2199.11 |
| 972.28  | 2199.78 | 979.85  | 2199.53 | 981.33  | 2199.48 | 984.31  | 2199.48 | 1008.13 | 2199.47 |
| 1038.81 | 2199.51 | 1042.84 | 2199.52 | 1048.96 | 2199.57 | 1054.25 | 2199.61 | 1063.12 | 2199.75 |
| 1073.69 | 2199.89 | 1074.96 | 2199.94 |         |         |         |         |         |         |

Manning's n Values num= 3

| Sta | n Val | Sta   | n Val | Sta    | n Val |
|-----|-------|-------|-------|--------|-------|
| 0   | .02   | 283.1 | .03   | 356.05 | .04   |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

|       |        |        |        |        |    |    |
|-------|--------|--------|--------|--------|----|----|
| 283.1 | 356.05 | 170.75 | 169.54 | 168.59 | .1 | .3 |
|-------|--------|--------|--------|--------|----|----|

Ineffective Flow num= 2

| Sta L  | Sta R   | Elev    | Permanent |
|--------|---------|---------|-----------|
| 0      | 228.82  | 2198.96 | F         |
| 773.51 | 1074.96 | 2199.94 | F         |

## CROSS SECTION

RIVER: Rancho  
REACH: lower RS: 8765.933

## INPUT

## Description:

Station Elevation Data num= 114

| Sta     | Elev    | Sta     | Elev    | Sta     | Elev    | Sta     | Elev    |
|---------|---------|---------|---------|---------|---------|---------|---------|
| 0       | 2189.46 | 13.4    | 2189.57 | 15.88   | 2189.58 | 19.95   | 2189.61 |
| 27.01   | 2189.76 | 44.11   | 2189.97 | 46.56   | 2190.01 | 46.71   | 2190.02 |
| 58.95   | 2190.52 | 60.33   | 2190.57 | 63.86   | 2190.71 | 64.32   | 2190.71 |
| 72.17   | 2190.78 | 82.46   | 2190.93 | 91.46   | 2191.09 | 106.23  | 2191.12 |
| 134.44  | 2191.16 | 139.95  | 2191.17 | 147.92  | 2191.22 | 151.71  | 2192.55 |
| 158.96  | 2193.48 | 165.16  | 2193.81 | 166.44  | 2193.83 | 201.27  | 2194.4  |
| 203.15  | 2194.43 | 225.44  | 2194.89 | 267.29  | 2193.47 | 268.88  | 2193.42 |
| 269.36  | 2193.46 | 277.34  | 2194.15 | 280     | 2194.06 | 287.57  | 2193.83 |
| 319.96  | 2193.03 | 357.27  | 2195.52 | 358.27  | 2195.57 | 362.82  | 2195.91 |
| 379.71  | 2196.47 | 381.04  | 2196.1  | 382.14  | 2195.75 | 396.08  | 2194.72 |
| 397.24  | 2194.66 | 404.59  | 2194.88 | 419.44  | 2195.13 | 444.61  | 2195.61 |
| 465.47  | 2196.45 | 476.38  | 2197.95 | 481.78  | 2197.9  | 487.59  | 2197.8  |
| 529.08  | 2198.13 | 537.8   | 2198.25 | 581.57  | 2198.23 | 592.22  | 2198.24 |
| 609.4   | 2198.1  | 619.69  | 2198.01 | 647.27  | 2197.86 | 692.82  | 2197.87 |
| 744.21  | 2197.72 | 779.98  | 2197.65 | 805.29  | 2197.78 | 811.85  | 2197.77 |
| 867.89  | 2197.93 | 901.36  | 2198.26 | 921.21  | 2198.54 | 935.27  | 2198.66 |
| 973.38  | 2198.47 | 996.84  | 2198.22 | 1002.88 | 2198.17 | 1004.46 | 2198.17 |
| 1025.87 | 2198.29 | 1039.16 | 2198.04 | 1045.76 | 2198.08 | 1064.19 | 2198.91 |
| 1110.23 | 2198.32 | 1129.23 | 2198.41 | 1138.5  | 2198.72 | 1143.71 | 2199    |
| 1175.43 | 2199.7  | 1181.83 | 2199.95 | 1189.58 | 2200.01 | 1206.3  | 2200.24 |
| 1230.08 | 2200.13 | 1247.31 | 2200.11 | 1257.86 | 2199.87 | 1270.63 | 2199.77 |
| 1295.79 | 2199.69 | 1303.79 | 2199.6  | 1313.36 | 2199.38 | 1314.76 | 2199.35 |
| 1357.37 | 2200.14 | 1390.88 | 2200.77 | 1415.74 | 2200.68 | 1463.77 | 2200.84 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta    | n Val |
|-----|-------|-----|-------|--------|-------|
| 0   | .02   | 280 | .03   | 358.27 | .04   |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

|     |        |        |        |     |    |    |
|-----|--------|--------|--------|-----|----|----|
| 280 | 358.27 | 790.28 | 788.36 | 787 | .1 | .3 |
|-----|--------|--------|--------|-----|----|----|

Ineffective Flow num= 2

| Sta L  | Sta R   | Elev     | Permanent |
|--------|---------|----------|-----------|
| 0      | 225     | 2196.86  | F         |
| 728.08 | 1463.77 | 2200.843 | F         |

## CROSS SECTION

RIVER: Rancho  
REACH: lower RS: 7977.189

## INPUT

| Description: Smoke Ranch Road |           |         |         |         |         |         |         |         |         |
|-------------------------------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|
| Station                       | Elevation | Data    | num=    | 185     |         |         |         |         |         |
| Sta                           | Elev      | Sta     | Elev    | Sta     | Elev    | Sta     | Elev    | Sta     | Elev    |
| 0                             | 2187.32   | 36.94   | 2187.71 | 48.74   | 2188.01 | 66.94   | 2188.86 | 70.05   | 2188.98 |
| 84.51                         | 2189.22   | 106.44  | 2189.51 | 107.48  | 2189.51 | 110.59  | 2189.54 | 114.92  | 2189.39 |
| 150.65                        | 2189.79   | 217.49  | 2190.37 | 224.42  | 2190.43 | 227.53  | 2190.43 | 243.69  | 2190.36 |
| 248.26                        | 2190.4    | 279     | 2190.21 | 281.39  | 2190.21 | 285.62  | 2190.15 | 313.47  | 2190.13 |
| 322.78                        | 2190.27   | 333.81  | 2190.47 | 339.34  | 2190.3  | 351.22  | 2190.39 | 375.6   | 2190.66 |
| 382.68                        | 2190.8    | 384.89  | 2189.67 | 386.53  | 2188.38 | 396.66  | 2188.74 | 400.46  | 2188.82 |
| 403.01                        | 2189.08   | 408.47  | 2189.79 | 414.77  | 2191.09 | 416.91  | 2191.56 | 441     | 2192.33 |
| 446.28                        | 2192.26   | 452.31  | 2192.07 | 463.19  | 2192.08 | 468.41  | 2192.19 | 501.76  | 2192.51 |
| 511.39                        | 2192.64   | 529.75  | 2192.84 | 541.27  | 2192.92 | 562.93  | 2192.85 | 599.82  | 2192.96 |
| 606.52                        | 2192.99   | 610.13  | 2192.94 | 618.21  | 2193.08 | 619.7   | 2193.03 | 621.03  | 2193.05 |
| 621.42                        | 2193.06   | 621.62  | 2193.05 | 622.73  | 2192.95 | 623.51  | 2192.9  | 640.77  | 2192.33 |
| 645.01                        | 2192.18   | 648.48  | 2192.09 | 663.88  | 2191.32 | 678.36  | 2191.67 | 699.85  | 2192.29 |
| 729.31                        | 2193.61   | 730.93  | 2193.75 | 753.9   | 2193.89 | 782.19  | 2194.15 | 795.46  | 2194.23 |
| 798.15                        | 2194.43   | 805.01  | 2194.7  | 808.42  | 2194.85 | 814.95  | 2194.83 | 823.24  | 2194.68 |
| 839.55                        | 2194.43   | 852.55  | 2194.37 | 856.86  | 2194.27 | 869     | 2193.45 | 872.44  | 2193.41 |
| 935.53                        | 2192.81   | 944.25  | 2192.71 | 946.18  | 2192.85 | 950.3   | 2193.11 | 955.54  | 2196.02 |
| 956.89                        | 2196.68   | 959.13  | 2196.77 | 979.71  | 2196.88 | 994.4   | 2196.72 | 1001.46 | 2196.81 |
| 1026.35                       | 2196.77   | 1045.4  | 2196.59 | 1048.81 | 2196.57 | 1053.91 | 2196.58 | 1082.98 | 2196.1  |
| 1086.21                       | 2196.02   | 1091.43 | 2195.69 | 1096.37 | 2195.49 | 1098.46 | 2195.33 | 1103.92 | 2194.61 |
| 1156                          | 2194.9    | 1156.49 | 2194.91 | 1156.89 | 2194.91 | 1160.94 | 2194.93 | 1161.14 | 2194.93 |
| 1164.07                       | 2195.02   | 1165.14 | 2195.06 | 1167.25 | 2195.12 | 1171.09 | 2195.25 | 1171.82 | 2195.28 |
| 1172.26                       | 2195.29   | 1174.11 | 2195.37 | 1178.27 | 2195.51 | 1180.93 | 2195.57 | 1185.15 | 2195.7  |
| 1191.51                       | 2195.83   | 1192.86 | 2195.89 | 1194.38 | 2195.93 | 1198.88 | 2196.18 | 1199.61 | 2196.2  |
| 1200.88                       | 2196.24   | 1202.13 | 2196.25 | 1202.59 | 2196.35 | 1205.59 | 2196.6  | 1213.42 | 2196.21 |
| 1228.12                       | 2196.34   | 1236.08 | 2196.33 | 1242.27 | 2196.39 | 1247.77 | 2196.5  | 1250.82 | 2196.54 |
| 1256.06                       | 2196.59   | 1258.57 | 2196.59 | 1261.22 | 2196.61 | 1265.24 | 2196.65 | 1267.87 | 2196.66 |
| 1271.44                       | 2196.69   | 1280.63 | 2196.58 | 1283.04 | 2196.6  | 1288.02 | 2196.6  | 1290.22 | 2196.63 |
| 1291.58                       | 2196.64   | 1292.69 | 2196.63 | 1294.03 | 2196.61 | 1296.96 | 2196.55 | 1301.41 | 2196.43 |
| 1302.5                        | 2196.38   | 1307.28 | 2195.79 | 1310.09 | 2195.78 | 1312.44 | 2195.79 | 1346.93 | 2195.83 |
| 1347.16                       | 2195.83   | 1351.98 | 2196.31 | 1359.59 | 2196.8  | 1360.83 | 2196.87 | 1360.95 | 2196.87 |
| 1362.2                        | 2196.93   | 1365.97 | 2196.96 | 1367.35 | 2196.93 | 1380.32 | 2197.13 | 1413.91 | 2197.55 |
| 1438.91                       | 2197.51   | 1451.57 | 2197.65 | 1451.81 | 2197.85 | 1453.67 | 2199.92 | 1459.46 | 2199.92 |
| 1463.35                       | 2199.87   | 1467.07 | 2199.91 | 1471.69 | 2199.91 | 1487.47 | 2199.63 | 1528.56 | 2199.16 |
| 1529.68                       | 2199.16   | 1531.54 | 2199.15 | 1547.25 | 2199.49 | 1550.77 | 2199.02 | 1553.55 | 2198.34 |
| 1554.58                       | 2198.26   | 1558.86 | 2197.97 | 1598.61 | 2197.83 | 1609.36 | 2198.75 | 1611.82 | 2199.02 |
| 1619.79                       | 2199.09   | 1650.44 | 2199.42 | 1660.12 | 2199.51 | 1663.99 | 2199.58 | 1667.09 | 2199.65 |
| 1698.14                       | 2200.02   | 1707.88 | 2200.47 | 1714.73 | 2200.54 | 1733.69 | 2200.96 | 1738.97 | 2201.07 |

| Manning's n Values |       |        |       |        |
|--------------------|-------|--------|-------|--------|
| Sta                | n Val | Sta    | n Val | Sta    |
| 0                  | .02   | 382.68 | .03   | 414.77 |

| Bank Sta:        | Left    | Right    | Lengths:  | Left Channel | Right   | Coeff | Contr. | Expan. |
|------------------|---------|----------|-----------|--------------|---------|-------|--------|--------|
|                  | 382.68  | 414.77   |           | 369.778      | 369.778 |       | .1     | .3     |
| Ineffective Flow |         |          | num=      | 4            |         |       |        |        |
| Sta L            | Sta R   | Elev     | Permanent |              |         |       |        |        |
| 0                | 142     | 2194.15  | F         |              |         |       |        |        |
| 426.38           | 1123.82 | 2194.715 | F         |              |         |       |        |        |
| 1163.61          | 1312.92 | 2195.786 | F         |              |         |       |        |        |
| 1364.67          | 1738.97 | 2201.07  | F         |              |         |       |        |        |

## CROSS SECTION

RIVER: Rancho  
REACH: lower RS: 7607.411

| Description: |           |        |         |        |         |        |         |        |         |
|--------------|-----------|--------|---------|--------|---------|--------|---------|--------|---------|
| Station      | Elevation | Data   | num=    | 38     |         |        |         |        |         |
| Sta          | Elev      | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    |
| 0            | 2186.45   | 13.25  | 2186.75 | 47.83  | 2187.69 | 52.03  | 2187.79 | 53.47  | 2188.12 |
| 61.72        | 2190.35   | 64.54  | 2189.72 | 70.08  | 2188.4  | 71     | 2188.18 | 71.77  | 2187.99 |
| 75.31        | 2187.65   | 78.46  | 2187.3  | 105.68 | 2187.88 | 122.2  | 2188.21 | 139.58 | 2188.57 |
| 142.1        | 2188.56   | 145.46 | 2188.51 | 184.22 | 2187.95 | 190.16 | 2187.86 | 190.68 | 2187.84 |
| 191.24       | 2187.82   | 192.86 | 2187.77 | 200.93 | 2187.52 | 209.74 | 2185.35 | 216.92 | 2183.56 |
| 223.16       | 2183.92   | 232.58 | 2184.39 | 237.52 | 2185.46 | 242.93 | 2186.68 | 245.83 | 2187.33 |
| 246.48       | 2187.46   | 251.82 | 2189.18 | 259.09 | 2189.22 | 263.65 | 2189.18 | 276.9  | 2189.24 |
| 288.41       | 2189.41   | 301.38 | 2189.87 | 366.73 | 2190.31 |        |         |        |         |

| Manning's n Values |       |        |       |        |
|--------------------|-------|--------|-------|--------|
| Sta                | n Val | Sta    | n Val | Sta    |
| 0                  | .02   | 200.93 | .03   | 251.82 |

| Bank Sta:        | Left   | Right    | Lengths:  | Left Channel | Right  | Coeff | Contr. | Expan. |
|------------------|--------|----------|-----------|--------------|--------|-------|--------|--------|
|                  | 200.93 | 251.82   |           | 139.37       | 138.14 |       | .1     | .3     |
| Ineffective Flow |        |          | num=      | 2            |        |       |        |        |
| Sta L            | Sta R  | Elev     | Permanent |              |        |       |        |        |
| 0                | 138.81 | 2190.74  | F         |              |        |       |        |        |
| 307.66           | 366.73 | 2190.305 | F         |              |        |       |        |        |

## CROSS SECTION

RIVER: Rancho  
REACH: lower RS: 7469.225

## INPUT

## Description:

| Station | Elevation | Data   | num=    | 42     | Sta     | Elev   | Sta     | Elev   | Sta     | Elev | Sta | Elev |
|---------|-----------|--------|---------|--------|---------|--------|---------|--------|---------|------|-----|------|
| 0       | 2185.75   | 27.19  | 2186.67 | 31.46  | 2186.8  | 32.61  | 2186.87 | 38.47  | 2187.67 |      |     |      |
| 42.17   | 2188.18   | 44.44  | 2187.84 | 50.41  | 2187.03 | 51.03  | 2186.94 | 54.55  | 2186.67 |      |     |      |
| 56.6    | 2186.5    | 57.81  | 2186.39 | 73.81  | 2186.86 | 102.65 | 2187.72 | 107.85 | 2187.88 |      |     |      |
| 113.93  | 2188      | 145.83 | 2187.3  | 161.47 | 2186.95 | 170.23 | 2186.74 | 172.27 | 2186.69 |      |     |      |
| 174.34  | 2186.64   | 179.02 | 2186.53 | 184.17 | 2183.33 | 188.05 | 2181.89 | 192.27 | 2181.6  |      |     |      |
| 193.63  | 2181.6    | 204.87 | 2181.6  | 214.15 | 2181.6  | 217    | 2181.6  | 220    | 2183.36 |      |     |      |
| 225.22  | 2186.02   | 226.69 | 2186.92 | 227.2  | 2187.03 | 230.66 | 2187.36 | 241.13 | 2187.66 |      |     |      |
| 245.43  | 2187.79   | 248.26 | 2187.89 | 255.22 | 2188.15 | 288.28 | 2189.48 | 296.59 | 2189.54 |      |     |      |
| 361.58  | 2189.75   | 377.91 | 2189.72 |        |         |        |         |        |         |      |     |      |

## Manning's n Values

num=

3

| Sta | n Val | Sta    | n Val | Sta    | n Val |
|-----|-------|--------|-------|--------|-------|
| 0   | .02   | 179.02 | .03   | 230.66 | .04   |

| Bank Sta: | Left   | Right  | Lengths: | Left Channel | Right | Coeff | Contr. | Expan. |
|-----------|--------|--------|----------|--------------|-------|-------|--------|--------|
|           | 179.02 | 230.66 |          | 69.2         | 69.2  |       | .1     | .3     |

| Ineffective Flow           | num= | 2 |
|----------------------------|------|---|
| Sta L Sta R Elev Permanent |      |   |
| 0 113 2190 F               |      |   |
| 286.88 377.912189.716 F    |      |   |

## CULVERT

RIVER: Rancho

REACH: lower

RS: 7405

## INPUT

## Description:

Distance from Upstream XS = 5  
 Deck/Roadway Width = 60  
 Weir Coefficient = 2.6

## Upstream Deck/Roadway Coordinates

| num=                                    | 2 |
|-----------------------------------------|---|
| Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord |   |
| 176 2186.5 2180 270 2186 2180           |   |

## Upstream Bridge Cross Section Data

| Station | Elevation | Data   | num=    | 42     | Sta     | Elev   | Sta     | Elev   | Sta     | Elev | Sta | Elev |
|---------|-----------|--------|---------|--------|---------|--------|---------|--------|---------|------|-----|------|
| 0       | 2185.75   | 27.19  | 2186.67 | 31.46  | 2186.8  | 32.61  | 2186.87 | 38.47  | 2187.67 |      |     |      |
| 42.17   | 2188.18   | 44.44  | 2187.84 | 50.41  | 2187.03 | 51.03  | 2186.94 | 54.55  | 2186.67 |      |     |      |
| 56.6    | 2186.5    | 57.81  | 2186.39 | 73.81  | 2186.86 | 102.65 | 2187.72 | 107.85 | 2187.88 |      |     |      |
| 113.93  | 2188      | 145.83 | 2187.3  | 161.47 | 2186.95 | 170.23 | 2186.74 | 172.27 | 2186.69 |      |     |      |
| 174.34  | 2186.64   | 179.02 | 2186.53 | 184.17 | 2183.33 | 188.05 | 2181.89 | 192.27 | 2181.6  |      |     |      |
| 193.63  | 2181.6    | 204.87 | 2181.6  | 214.15 | 2181.6  | 217    | 2181.6  | 220    | 2183.36 |      |     |      |
| 225.22  | 2186.02   | 226.69 | 2186.92 | 227.2  | 2187.03 | 230.66 | 2187.36 | 241.13 | 2187.66 |      |     |      |
| 245.43  | 2187.79   | 248.26 | 2187.89 | 255.22 | 2188.15 | 288.28 | 2189.48 | 296.59 | 2189.54 |      |     |      |
| 361.58  | 2189.75   | 377.91 | 2189.72 |        |         |        |         |        |         |      |     |      |

## Manning's n Values

num=

3

| Sta | n Val | Sta    | n Val | Sta    | n Val |
|-----|-------|--------|-------|--------|-------|
| 0   | .02   | 179.02 | .03   | 230.66 | .04   |

| Bank Sta: | Left   | Right  | Coeff | Contr. | Expan. |
|-----------|--------|--------|-------|--------|--------|
|           | 179.02 | 230.66 |       | .1     | .3     |

| Ineffective Flow           | num= | 2 |
|----------------------------|------|---|
| Sta L Sta R Elev Permanent |      |   |
| 0 113 2190 F               |      |   |
| 286.88 377.912189.716 F    |      |   |

## Downstream Deck/Roadway Coordinates

| num=                                    | 2 |
|-----------------------------------------|---|
| Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord |   |
| 176 2186.5 2180 285 2186 2180           |   |

## Downstream Bridge Cross Section Data

| Station | Elevation | Data   | num=    | 101    | Sta     | Elev    | Sta     | Elev    | Sta     | Elev | Sta | Elev |
|---------|-----------|--------|---------|--------|---------|---------|---------|---------|---------|------|-----|------|
| 0       | 2183.65   | 31.13  | 2184.56 | 49.67  | 2185.06 | 53.91   | 2185.3  | 88.96   | 2186.29 |      |     |      |
| 91.29   | 2186.4    | 99.86  | 2186.96 | 100.15 | 2186.98 | 100.26  | 2186.97 | 106.51  | 2186.44 |      |     |      |
| 108.05  | 2186.3    | 113.9  | 2185.96 | 115.3  | 2185.89 | 159.85  | 2187.09 | 166.03  | 2187.1  |      |     |      |
| 170.26  | 2187.12   | 227.87 | 2186.15 | 230.03 | 2186.12 | 230.99  | 2186.11 | 231.35  | 2186.09 |      |     |      |
| 232.18  | 2186.08   | 238.47 | 2180.49 | 243.76 | 2180.49 | 258.15  | 2180.49 | 267.58  | 2180.49 |      |     |      |
| 280.12  | 2185.78   | 281.51 | 2185.79 | 287.26 | 2185.92 | 302.9   | 2186.61 | 318.5   | 2187.36 |      |     |      |
| 327.75  | 2187.79   | 342.17 | 2188.28 | 345.43 | 2188.51 | 349.19  | 2188.56 | 406.54  | 2188.88 |      |     |      |
| 416.86  | 2188.95   | 418.69 | 2188.95 | 426.07 | 2188.93 | 522.27  | 2189.09 | 533.76  | 2189.02 |      |     |      |
| 542.85  | 2189.04   | 551.66 | 2189.19 | 558.61 | 2189.2  | 595.92  | 2189.38 | 604.52  | 2189.06 |      |     |      |
| 611.15  | 2189.09   | 623.26 | 2187.64 | 625.71 | 2187.34 | 639.64  | 2186.03 | 657.77  | 2186.01 |      |     |      |
| 670.54  | 2186.04   | 686.39 | 2186.4  | 688.37 | 2186.46 | 724.86  | 2189.47 | 727.91  | 2189.78 |      |     |      |
| 732.13  | 2189.85   | 777.82 | 2188.93 | 785.67 | 2188.79 | 803.22  | 2188.36 | 804.97  | 2188.33 |      |     |      |
| 810.25  | 2188.02   | 815.68 | 2186.65 | 816.54 | 2186.44 | 856.69  | 2185.64 | 877.74  | 2185.19 |      |     |      |
| 887.73  | 2186.61   | 891.44 | 2186.8  | 906.31 | 2187.72 | 907.61  | 2188.15 | 909.96  | 2188.92 |      |     |      |
| 910.3   | 2189.06   | 930.89 | 2188.97 | 991.48 | 2188.87 | 1009.11 | 2187.02 | 1013.67 | 2186.51 |      |     |      |



|         |         |         |         |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 1015.56 | 2186.29 | 1035.77 | 2186.3  | 1051.86 | 2186.27 | 1062.22 | 2186.27 | 1065.16 | 2186.26 |
| 1065.31 | 2186.26 | 1069.38 | 2186.45 | 1069.47 | 2186.45 | 1088.31 | 2186.66 | 1088.75 | 2186.66 |
| 1117.51 | 2186.99 | 1118.19 | 2186.99 | 1146.2  | 2187.31 | 1147.46 | 2187.32 | 1166.78 | 2187.4  |
| 1168.38 | 2187.41 | 1187.45 | 2187.49 | 1223.17 | 2187.65 | 1226.36 | 2187.65 | 1251.16 | 2187.75 |
| 1255.05 | 2187.75 | 1279.17 | 2187.85 | 1301.42 | 2187.98 | 1305.17 | 2188.01 | 1329.1  | 2188.15 |
| 1331.8  | 2188.16 |         |         |         |         |         |         |         |         |

|                    |     |        |     |       |     |
|--------------------|-----|--------|-----|-------|-----|
| Manning's n Values |     |        |     | num=  | 3   |
| Sta                | n   | Val    | Sta | n     | Val |
| 0                  | .02 | 230.03 | .03 | 302.9 | .04 |

|                |       |       |        |        |
|----------------|-------|-------|--------|--------|
| Bank Sta: Left | Right | Coeff | Contr. | Expan. |
| 230.03         | 302.9 |       | .1     | .3     |

|                  |          |          |           |      |   |
|------------------|----------|----------|-----------|------|---|
| Ineffective Flow |          |          |           | num= | 4 |
| Sta L            | Sta R    | Elev     | Permanent |      |   |
| 0                | 100.89   | 2190     | F         |      |   |
| 344.94           | 1015.722 | 2188.473 | F         |      |   |
| 1064.59          | 1137.48  | 2188     | F         |      |   |
| 1140.86          | 1331.82  | 2188.164 | F         |      |   |

Upstream Embankment side slope = 0 horiz. to 1.0 vertical  
Downstream Embankment side slope = 0 horiz. to 1.0 vertical  
Maximum allowable submergence for weir flow = .95  
Elevation at which weir flow begins =  
Energy head used in spillway design =  
Spillway height used in design =  
Weir crest shape = Broad Crested

Number of Culverts = 1

|              |       |      |      |
|--------------|-------|------|------|
| Culvert Name | Shape | Rise | Span |
| Culvert #1   | Box   | 2.9  | 5.5  |

FHWA Chart # 8 - flared wingwalls  
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.  
Solution Criteria = Highest U.S. EG  
Culvert Upstrm Dist Length Top n Bottom n Depth Blocked Entrance Loss Coef Exit Loss Coef

|   |    |      |      |   |  |    |   |
|---|----|------|------|---|--|----|---|
| 5 | 60 | .012 | .012 | 0 |  | .2 | 1 |
|---|----|------|------|---|--|----|---|

Number of Barrels = 5

Upstream Elevation = 2181.7

Centerline Stations

|      |      |      |      |      |
|------|------|------|------|------|
| Sta. | Sta. | Sta. | Sta. | Sta. |
| 191  | 197  | 203  | 209  | 215  |

Downstream Elevation = 2180.5

Centerline Stations

|      |      |      |      |      |
|------|------|------|------|------|
| Sta. | Sta. | Sta. | Sta. | Sta. |
| 240  | 246  | 252  | 258  | 264  |

## CROSS SECTION

RIVER: Rancho

REACH: lower RS: 7400

## INPUT

Description:

|                        |         |         |         |         |         |
|------------------------|---------|---------|---------|---------|---------|
| Station Elevation Data |         |         |         | num=    | 101     |
| Sta                    | Elev    | Sta     | Elev    | Sta     | Elev    |
| 0                      | 2183.65 | 31.13   | 2184.56 | 49.67   | 2185.06 |
| 91.29                  | 2186.4  | 99.86   | 2186.96 | 100.15  | 2186.98 |
| 108.05                 | 2186.3  | 113.9   | 2185.96 | 115.3   | 2185.89 |
| 170.26                 | 2187.12 | 227.87  | 2186.15 | 230.03  | 2186.12 |
| 232.18                 | 2186.08 | 238.47  | 2180.49 | 243.76  | 2180.49 |
| 280.12                 | 2185.78 | 281.51  | 2185.79 | 287.26  | 2185.92 |
| 327.75                 | 2187.79 | 342.17  | 2188.28 | 345.43  | 2188.51 |
| 416.86                 | 2188.95 | 418.69  | 2188.95 | 426.07  | 2188.93 |
| 542.85                 | 2189.04 | 551.66  | 2189.19 | 558.61  | 2189.2  |
| 611.15                 | 2189.09 | 623.26  | 2187.64 | 625.71  | 2187.34 |
| 670.54                 | 2186.04 | 686.39  | 2186.4  | 688.37  | 2186.46 |
| 732.13                 | 2189.85 | 777.82  | 2188.93 | 785.67  | 2188.79 |
| 810.25                 | 2188.02 | 815.68  | 2186.65 | 816.54  | 2186.44 |
| 887.73                 | 2186.61 | 891.44  | 2186.8  | 906.31  | 2187.72 |
| 910.3                  | 2189.06 | 930.89  | 2188.97 | 991.48  | 2188.87 |
| 1015.56                | 2186.29 | 1035.77 | 2186.3  | 1051.86 | 2186.27 |
| 1065.31                | 2186.26 | 1069.38 | 2186.45 | 1069.47 | 2186.45 |
| 1117.51                | 2186.99 | 1118.19 | 2186.99 | 1146.2  | 2187.31 |
| 1168.38                | 2187.41 | 1187.45 | 2187.49 | 1223.17 | 2187.65 |
| 1255.05                | 2187.75 | 1279.17 | 2187.85 | 1301.42 | 2187.98 |
| 1331.8                 | 2188.16 |         |         |         |         |

|                    |     |        |     |       |     |
|--------------------|-----|--------|-----|-------|-----|
| Manning's n Values |     |        |     | num=  | 3   |
| Sta                | n   | Val    | Sta | n     | Val |
| 0                  | .02 | 230.03 | .03 | 302.9 | .04 |

|                |       |               |         |        |       |        |        |
|----------------|-------|---------------|---------|--------|-------|--------|--------|
| Bank Sta: Left | Right | Lengths: Left | Channel | Right  | Coeff | Contr. | Expan. |
| 230.03         | 302.9 | 119.1         | 119.26  | 119.58 |       | .1     | .3     |

|                  |          |          |           |      |   |
|------------------|----------|----------|-----------|------|---|
| Ineffective Flow |          |          |           | num= | 4 |
| Sta L            | Sta R    | Elev     | Permanent |      |   |
| 0                | 100.89   | 2190     | F         |      |   |
| 344.94           | 1015.722 | 2188.473 | F         |      |   |

1064.59 1137.48 2188 F  
 1140.86 1331.82188.164 F

## CROSS SECTION

RIVER: Rancho  
 REACH: lower RS: 7280.748

## INPUT

Description:

| Station | Elevation | Data   | num=    | 53     | Sta     | Elev   | Sta     | Elev   | Sta     | Elev | Sta | Elev |
|---------|-----------|--------|---------|--------|---------|--------|---------|--------|---------|------|-----|------|
| 0       | 2184.21   | 4.82   | 2184.31 | 13.25  | 2184.42 | 16.23  | 2184.34 | 20.45  | 2184.22 |      |     |      |
| 26.51   | 2184.09   | 40.66  | 2184.56 | 78.66  | 2185.77 | 78.91  | 2185.77 | 80.45  | 2185.77 |      |     |      |
| 82.1    | 2185.77   | 83.86  | 2185.77 | 85.77  | 2185.77 | 85.88  | 2185.77 | 87.94  | 2185.76 |      |     |      |
| 89.36   | 2185.75   | 90.15  | 2185.73 | 91.5   | 2185.72 | 101.98 | 2185.49 | 115.97 | 2185.2  |      |     |      |
| 122.45  | 2185.07   | 126.15 | 2184.99 | 137.93 | 2184.72 | 139    | 2184.7  | 141.28 | 2184.79 |      |     |      |
| 142.26  | 2184.86   | 146.86 | 2185.16 | 147.51 | 2184.81 | 149.58 | 2183.71 | 152.15 | 2182.35 |      |     |      |
| 152.78  | 2181.5    | 154.31 | 2179.57 | 154.66 | 2179.57 | 156.27 | 2179.56 | 161.38 | 2179.36 |      |     |      |
| 167.1   | 2179.2    | 168.41 | 2179.17 | 169.43 | 2179.13 | 171.06 | 2179.2  | 173.38 | 2179.29 |      |     |      |
| 183.06  | 2179.73   | 186.93 | 2179.64 | 189.12 | 2179.3  | 190.97 | 2179.98 | 191.66 | 2180.33 |      |     |      |
| 193.67  | 2181.25   | 197.77 | 2184.13 | 217.19 | 2184.46 | 218.14 | 2184.47 | 219.18 | 2184.48 |      |     |      |
| 239.87  | 2185.3    | 266.66 | 2185.53 | 282.89 | 2185.88 |        |         |        |         |      |     |      |

Manning's n Values num= 3  

| Sta | n Val | Sta    | n Val | Sta    | n Val |
|-----|-------|--------|-------|--------|-------|
| 0   | .02   | 146.86 | .03   | 197.77 | .04   |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 146.86 197.77 91.54 90.58 90.76 .1 .3  
 Ineffective Flow num= 2  

| Sta L  | Sta R  | Elev     | Permanent |
|--------|--------|----------|-----------|
| 0      | 85.81  | 2185.95  | F         |
| 261.72 | 282.89 | 2185.876 | F         |

## CULVERT

RIVER: Rancho  
 REACH: lower RS: 7255

## INPUT

Description:

Distance from Upstream XS = 9  
 Deck/Roadway Width = 66  
 Weir Coefficient = 2.6  
 Upstream Deck/Roadway Coordinates  
 num= 2  

| Sta | Hi   | Cord | Lo  | Cord   | Sta  | Hi | Cord | Lo | Cord |
|-----|------|------|-----|--------|------|----|------|----|------|
| 145 | 2185 | 2178 | 200 | 2184.5 | 2178 |    |      |    |      |

## Upstream Bridge Cross Section Data

| Station | Elevation | Data   | num=    | 53     | Sta     | Elev   | Sta     | Elev   | Sta     | Elev | Sta | Elev |
|---------|-----------|--------|---------|--------|---------|--------|---------|--------|---------|------|-----|------|
| 0       | 2184.21   | 4.82   | 2184.31 | 13.25  | 2184.42 | 16.23  | 2184.34 | 20.45  | 2184.22 |      |     |      |
| 26.51   | 2184.09   | 40.66  | 2184.56 | 78.66  | 2185.77 | 78.91  | 2185.77 | 80.45  | 2185.77 |      |     |      |
| 82.1    | 2185.77   | 83.86  | 2185.77 | 85.77  | 2185.77 | 85.88  | 2185.77 | 87.94  | 2185.76 |      |     |      |
| 89.36   | 2185.75   | 90.15  | 2185.73 | 91.5   | 2185.72 | 101.98 | 2185.49 | 115.97 | 2185.2  |      |     |      |
| 122.45  | 2185.07   | 126.15 | 2184.99 | 137.93 | 2184.72 | 139    | 2184.7  | 141.28 | 2184.79 |      |     |      |
| 142.26  | 2184.86   | 146.86 | 2185.16 | 147.51 | 2184.81 | 149.58 | 2183.71 | 152.15 | 2182.35 |      |     |      |
| 152.78  | 2181.5    | 154.31 | 2179.57 | 154.66 | 2179.57 | 156.27 | 2179.56 | 161.38 | 2179.36 |      |     |      |
| 167.1   | 2179.2    | 168.41 | 2179.17 | 169.43 | 2179.13 | 171.06 | 2179.2  | 173.38 | 2179.29 |      |     |      |
| 183.06  | 2179.73   | 186.93 | 2179.64 | 189.12 | 2179.3  | 190.97 | 2179.98 | 191.66 | 2180.33 |      |     |      |
| 193.67  | 2181.25   | 197.77 | 2184.13 | 217.19 | 2184.46 | 218.14 | 2184.47 | 219.18 | 2184.48 |      |     |      |
| 239.87  | 2185.3    | 266.66 | 2185.53 | 282.89 | 2185.88 |        |         |        |         |      |     |      |

Manning's n Values num= 3  

| Sta | n Val | Sta    | n Val | Sta    | n Val |
|-----|-------|--------|-------|--------|-------|
| 0   | .02   | 146.86 | .03   | 197.77 | .04   |

Bank Sta: Left Right Coeff Contr. Expan.  
 146.86 197.77 .1 .3  
 Ineffective Flow num= 2  

| Sta L  | Sta R  | Elev     | Permanent |
|--------|--------|----------|-----------|
| 0      | 85.81  | 2185.95  | F         |
| 261.72 | 282.89 | 2185.876 | F         |

## Downstream Deck/Roadway Coordinates

num= 2  

| Sta | Hi   | Cord | Lo  | Cord   | Sta  | Hi | Cord | Lo | Cord |
|-----|------|------|-----|--------|------|----|------|----|------|
| 171 | 2184 | 2178 | 278 | 2184.1 | 2178 |    |      |    |      |

## Downstream Bridge Cross Section Data

| Station | Elevation | Data  | num=    | 46    | Sta     | Elev  | Sta     | Elev  | Sta     | Elev | Sta | Elev |
|---------|-----------|-------|---------|-------|---------|-------|---------|-------|---------|------|-----|------|
| 0       | 2182.48   | .01   | 2182.48 | 13.89 | 2182.76 | 25.07 | 2183.25 | 27.97 | 2183.35 |      |     |      |
| 31.14   | 2183.74   | 37.21 | 2184.81 | 43.17 | 2184.25 | 46.84 | 2183.79 | 47.33 | 2183.73 |      |     |      |
| 49.86   | 2183.26   | 53.75 | 2182.5  | 74.49 | 2183.59 | 81.76 | 2183.98 | 86.2  | 2184.17 |      |     |      |

|        |         |        |         |        |         |        |         |        |         |
|--------|---------|--------|---------|--------|---------|--------|---------|--------|---------|
| 86.26  | 2184.17 | 103.71 | 2184.41 | 111.88 | 2184.53 | 113.03 | 2184.52 | 122.39 | 2184.39 |
| 135.26 | 2184.4  | 152.39 | 2183.89 | 159.57 | 2183.67 | 167.29 | 2183.31 | 169.48 | 2183.81 |
| 172.95 | 2183.87 | 173.51 | 2183.67 | 179.1  | 2181.71 | 184.2  | 2179.68 | 186.43 | 2178.64 |
| 190.04 | 2178.1  | 192.65 | 2178.06 | 201.34 | 2178.47 | 215.21 | 2178.97 | 217.37 | 2179.52 |
| 221.17 | 2180.93 | 228.24 | 2184.1  | 254.17 | 2185.25 | 268.46 | 2185.75 | 271.92 | 2185.86 |
| 272.86 | 2185.86 | 273.84 | 2185.86 | 277.64 | 2185.84 | 281.71 | 2185.89 | 301.96 | 2186.92 |
| 318.17 | 2187.3  |        |         |        |         |        |         |        |         |

Manning's n Values num= 3

| Sta | n Val | Sta    | n Val | Sta    | n Val |
|-----|-------|--------|-------|--------|-------|
| 0   | .02   | 172.95 | .03   | 228.24 | .04   |

Bank Sta: Left Right Coeff Contr. Expan.  
 172.95 228.24 .1 .3

Ineffective Flow num= 2

| Sta L  | Sta R  | Elev     | Permanent |
|--------|--------|----------|-----------|
| 301.13 | 318.17 | 2187.298 | F         |
| 0      | 111.88 | 2187     | F         |

Upstream Embankment side slope = 0 horiz. to 1.0 vertical  
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical  
 Maximum allowable submergence for weir flow = .95  
 Elevation at which weir flow begins =  
 Energy head used in spillway design =  
 Spillway height used in design =  
 Weir crest shape = Broad Crested

Number of Culverts = 1

| Culvert Name | Shape | Rise | Span |
|--------------|-------|------|------|
| Culvert #1   | Box   | 2.9  | 5.5  |

FHWA Chart # 8 - flared wingwalls  
 FHWA Scale # 1 - Wingwall flared 30 to 75 deg.  
 Solution Criteria = Highest U.S. EG

| Culvert | Upstrm Dist | Length | Top n | Bottom n | Depth Blocked | Entrance Loss Coef | Exit Loss Coef |
|---------|-------------|--------|-------|----------|---------------|--------------------|----------------|
| 9       | 66          | .012   | .012  | 0        | .2            | 1                  |                |

Number of Barrels = 5

Upstream Elevation = 2179.2

Centerline Stations

| Sta. | Sta. | Sta. | Sta. | Sta. |
|------|------|------|------|------|
| 159  | 165  | 171  | 177  | 183  |

Downstream Elevation = 2178.5

Centerline Stations

| Sta. | Sta. | Sta. | Sta.  | Sta. |
|------|------|------|-------|------|
| 187  | 194  | 200  | 206.5 | 213  |

CROSS SECTION

RIVER: Rancho

REACH: lower RS: 7190.137

INPUT

Description:

| Station | Elevation | Data   | num=    | 46     | Sta     | Elev   | Sta     | Elev   | Sta     | Elev | Sta | Elev |
|---------|-----------|--------|---------|--------|---------|--------|---------|--------|---------|------|-----|------|
| 0       | 2182.48   | .01    | 2182.48 | 13.89  | 2182.76 | 25.07  | 2183.25 | 27.97  | 2183.35 |      |     |      |
| 31.14   | 2183.74   | 37.21  | 2184.81 | 43.17  | 2184.25 | 46.84  | 2183.79 | 47.33  | 2183.73 |      |     |      |
| 49.86   | 2183.26   | 53.75  | 2182.5  | 74.49  | 2183.59 | 81.76  | 2183.98 | 86.2   | 2184.17 |      |     |      |
| 86.26   | 2184.17   | 103.71 | 2184.41 | 111.88 | 2184.53 | 113.03 | 2184.52 | 122.39 | 2184.39 |      |     |      |
| 135.26  | 2184.4    | 152.39 | 2183.89 | 159.57 | 2183.67 | 167.29 | 2183.31 | 169.48 | 2183.81 |      |     |      |
| 172.95  | 2183.87   | 173.51 | 2183.67 | 179.1  | 2181.71 | 184.2  | 2179.68 | 186.43 | 2178.64 |      |     |      |
| 190.04  | 2178.1    | 192.65 | 2178.06 | 201.34 | 2178.47 | 215.21 | 2178.97 | 217.37 | 2179.52 |      |     |      |
| 221.17  | 2180.93   | 228.24 | 2184.1  | 254.17 | 2185.25 | 268.46 | 2185.75 | 271.92 | 2185.86 |      |     |      |
| 272.86  | 2185.86   | 273.84 | 2185.86 | 277.64 | 2185.84 | 281.71 | 2185.89 | 301.96 | 2186.92 |      |     |      |
| 318.17  | 2187.3    |        |         |        |         |        |         |        |         |      |     |      |

Manning's n Values num= 3

| Sta | n Val | Sta    | n Val | Sta    | n Val |
|-----|-------|--------|-------|--------|-------|
| 0   | .02   | 172.95 | .03   | 228.24 | .04   |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 172.95 228.24 390.14 390.14 390.14 .1 .3

Ineffective Flow num= 2

| Sta L  | Sta R  | Elev     | Permanent |
|--------|--------|----------|-----------|
| 301.13 | 318.17 | 2187.298 | F         |
| 0      | 111.88 | 2187     | F         |

CROSS SECTION

RIVER: Rancho

REACH: lower RS: 6800

INPUT

Description: Lake Mead Drive

| Station | Elevation | Data  | num=    | 86    | Sta     | Elev  | Sta     | Elev  | Sta     | Elev | Sta | Elev |
|---------|-----------|-------|---------|-------|---------|-------|---------|-------|---------|------|-----|------|
| 0       | 2176.15   | 22.54 | 2176.37 | 26.55 | 2176.33 | 35.55 | 2176.18 | 57.65 | 2176.32 |      |     |      |

|        |         |        |         |        |         |        |         |        |         |
|--------|---------|--------|---------|--------|---------|--------|---------|--------|---------|
| 57.76  | 2176.32 | 66.59  | 2177.55 | 67.23  | 2177.59 | 75.02  | 2178.34 | 77.43  | 2178.37 |
| 79.01  | 2178.35 | 82.6   | 2178.29 | 86.29  | 2178.04 | 153.46 | 2179.17 | 157.27 | 2179.23 |
| 158.23 | 2179.25 | 160.73 | 2179.28 | 204.59 | 2178.27 | 207.97 | 2178.34 | 213.08 | 2178.43 |
| 223.79 | 2178.86 | 241.7  | 2179.5  | 266.63 | 2179.85 | 275.2  | 2180.08 | 294.11 | 2180.78 |
| 310.95 | 2180.78 | 337.63 | 2180.87 | 354.3  | 2180.54 | 360.33 | 2180.59 | 378.48 | 2180.13 |
| 385.75 | 2180.21 | 411.38 | 2181.61 | 446.66 | 2182.56 | 451.03 | 2182.72 | 453.43 | 2182.88 |
| 456.85 | 2182.49 | 461.28 | 2181.66 | 465.42 | 2181.03 | 479.72 | 2180.56 | 485.39 | 2180.54 |
| 486.46 | 2180.58 | 499.45 | 2180.72 | 522.72 | 2180.45 | 525.2  | 2180.43 | 527.16 | 2180.36 |
| 527.71 | 2180.29 | 559.6  | 2180.96 | 573.64 | 2181.31 | 578.25 | 2181.64 | 581.98 | 2182.1  |
| 600.39 | 2182.84 | 605.52 | 2182.94 | 626.49 | 2183    | 629.42 | 2183    | 637.34 | 2183.04 |
| 649.85 | 2183.14 | 652.64 | 2183.17 | 665.88 | 2183.1  | 671.28 | 2183.15 | 681.86 | 2183.12 |
| 694.3  | 2183.27 | 702.82 | 2183.27 | 716.35 | 2183.41 | 721.78 | 2183.42 | 735.16 | 2183.58 |
| 737.65 | 2183.59 | 753.83 | 2182.9  | 755.17 | 2182.9  | 767.53 | 2183.18 | 780.22 | 2182.76 |
| 780.83 | 2182.76 | 781.85 | 2182.72 | 797.46 | 2181.87 | 802.49 | 2181.62 | 810.31 | 2181.11 |
| 842.84 | 2181.46 | 852.32 | 2181.53 | 860.3  | 2183.67 | 861.3  | 2183.9  | 865.82 | 2183.9  |
| 918.07 | 2183.8  | 949.87 | 2183.25 | 959.6  | 2182.93 | 964.67 | 2182.32 | 965.27 | 2182.24 |
| 998.87 | 2182.55 |        |         |        |         |        |         |        |         |

Manning's n Values num= 3  
Sta n Val Sta n Val Sta n Val  
0 .02 204.59 .03 266.63 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
204.59 266.63 215.9 215.9 215.9 .1 .3  
Ineffective Flow num= 4  
Sta L Sta R Elev Permanent  
0 156 2180.65 F  
374 445.77 2182.54 F  
567.79 798.79 2181.8 F  
869.87 957.01 2183.89 F

## CROSS SECTION

RIVER: Rancho  
REACH: lower RS: 6584.101

## INPUT

Description: 232 fee south of Lake Mead Centerline

| Station | Elevation | Data   | num=    | 86     |         |        |         |        |         |
|---------|-----------|--------|---------|--------|---------|--------|---------|--------|---------|
| Sta     | Elev      | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    |
| 0       | 2171.72   | 22.54  | 2171.94 | 26.55  | 2171.9  | 35.55  | 2171.75 | 57.65  | 2171.89 |
| 57.76   | 2171.89   | 66.59  | 2173.12 | 67.23  | 2173.16 | 75.02  | 2173.91 | 77.43  | 2173.94 |
| 79.01   | 2173.92   | 82.6   | 2173.86 | 86.29  | 2173.61 | 153.46 | 2174.74 | 157.27 | 2174.8  |
| 158.23  | 2174.82   | 160.73 | 2174.85 | 204.59 | 2173.84 | 207.97 | 2173.91 | 213.08 | 2174    |
| 223.79  | 2174.43   | 241.7  | 2175.07 | 266.63 | 2175.42 | 275.2  | 2175.65 | 294.11 | 2176.35 |
| 310.95  | 2176.35   | 337.63 | 2176.44 | 354.3  | 2176.11 | 360.33 | 2176.16 | 378.48 | 2175.7  |
| 385.75  | 2175.78   | 411.38 | 2177.18 | 446.66 | 2178.13 | 451.03 | 2178.29 | 453.43 | 2178.45 |
| 456.85  | 2178.06   | 461.28 | 2177.23 | 465.42 | 2176.6  | 479.72 | 2176.13 | 485.39 | 2176.11 |
| 486.46  | 2176.15   | 499.45 | 2176.29 | 522.72 | 2176.02 | 525.2  | 2176    | 527.16 | 2175.93 |
| 527.71  | 2175.86   | 559.6  | 2176.53 | 573.64 | 2176.88 | 578.25 | 2177.21 | 581.98 | 2177.67 |
| 600.39  | 2178.41   | 605.52 | 2178.51 | 626.49 | 2178.57 | 629.42 | 2178.57 | 637.34 | 2178.61 |
| 649.85  | 2178.71   | 652.64 | 2178.74 | 665.88 | 2178.67 | 671.28 | 2178.72 | 681.86 | 2178.69 |
| 694.3   | 2178.84   | 702.82 | 2178.84 | 716.35 | 2178.98 | 721.78 | 2178.99 | 735.16 | 2179.15 |
| 737.65  | 2179.16   | 753.83 | 2178.47 | 755.17 | 2178.47 | 767.53 | 2178.75 | 780.22 | 2178.33 |
| 780.83  | 2178.33   | 781.85 | 2178.29 | 797.46 | 2177.44 | 802.49 | 2177.19 | 810.31 | 2176.68 |
| 842.84  | 2177.03   | 852.32 | 2177.1  | 860.3  | 2179.24 | 861.3  | 2179.47 | 865.82 | 2179.47 |
| 918.07  | 2179.37   | 949.87 | 2178.82 | 959.6  | 2178.5  | 964.67 | 2177.89 | 965.27 | 2177.81 |
| 998.87  | 2178.12   |        |         |        |         |        |         |        |         |

Manning's n Values num= 3  
Sta n Val Sta n Val Sta n Val  
0 .02 204.59 .03 275.2 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
204.59 275.2 694 694 694 .1 .3  
Ineffective Flow num= 4  
Sta L Sta R Elev Permanent  
0 159 2176.22 F  
374 445.772178.109 F  
567.79 798.792177.375 F  
869.87 957.012179.458 F

## CROSS SECTION

RIVER: Rancho  
REACH: lower RS: 5890

## INPUT

Description:

| Station | Elevation | Data   | num=    | 98     |         |        |         |        |         |
|---------|-----------|--------|---------|--------|---------|--------|---------|--------|---------|
| Sta     | Elev      | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    |
| 0       | 2162.52   | 45.53  | 2163.12 | 84.94  | 2163.78 | 86.59  | 2165.99 | 87.23  | 2166.89 |
| 91.15   | 2167.13   | 91.38  | 2167.14 | 91.51  | 2167.15 | 95.43  | 2167.12 | 98.91  | 2167.11 |
| 142.85  | 2168.01   | 161.95 | 2168.37 | 165.3  | 2168.47 | 172.43 | 2168.63 | 192.34 | 2167.98 |
| 216.56  | 2167.14   | 217.24 | 2167.49 | 217.82 | 2167.81 | 220.45 | 2167.73 | 225.26 | 2167.63 |
| 225.82  | 2167.62   | 235.11 | 2164.27 | 237.63 | 2163.26 | 242.53 | 2164.92 | 243.15 | 2165.15 |
| 244.61  | 2165.87   | 247.66 | 2167.27 | 252.33 | 2167.37 | 255.41 | 2167.51 | 257.48 | 2167.61 |

|        |         |        |         |        |         |        |         |        |         |
|--------|---------|--------|---------|--------|---------|--------|---------|--------|---------|
| 270.22 | 2167.85 | 276.37 | 2167.99 | 312.31 | 2168.7  | 325.25 | 2168.9  | 343.81 | 2169.24 |
| 364.38 | 2169.46 | 378.28 | 2169.54 | 393.27 | 2169.28 | 403.02 | 2169.08 | 421.17 | 2168.9  |
| 454.46 | 2168.69 | 463.75 | 2168.65 | 510.99 | 2168.2  | 516.74 | 2168.06 | 535.89 | 2168.48 |
| 537.52 | 2168.56 | 537.95 | 2168.37 | 539.43 | 2167.63 | 579.74 | 2168.15 | 583.29 | 2168.84 |
| 585.05 | 2169.15 | 590.81 | 2169.73 | 595.68 | 2169.91 | 599.59 | 2169.97 | 607.79 | 2170.38 |
| 612.42 | 2170.57 | 614.87 | 2170.61 | 626.86 | 2171.02 | 631.22 | 2170.95 | 643.83 | 2171.02 |
| 644.96 | 2171.05 | 664.61 | 2171.08 | 665.25 | 2171.08 | 694.23 | 2171.18 | 700.59 | 2171.18 |
| 717.22 | 2171.24 | 726.57 | 2171.25 | 735.69 | 2171.18 | 742.97 | 2171.1  | 752.43 | 2171.14 |
| 756.95 | 2171.12 | 767.8  | 2171.23 | 769.68 | 2171.23 | 778.41 | 2171.12 | 783.18 | 2170.98 |
| 785.48 | 2170.97 | 787.89 | 2170.8  | 795.96 | 2169.59 | 797.13 | 2169.56 | 799.44 | 2169.34 |
| 801.25 | 2169.16 | 803.72 | 2168.62 | 804.64 | 2168.39 | 868.35 | 2169.12 | 869.12 | 2170.09 |
| 870.88 | 2172.22 | 872.31 | 2172.29 | 881.05 | 2172.7  | 892.52 | 2172.9  | 911.99 | 2172.94 |
| 912.32 | 2172.94 | 942.97 | 2173.22 | 949.17 | 2173.25 | 953.3  | 2173.1  | 968.63 | 2172.36 |
| 971.28 | 2172.24 | 979.34 | 2171.94 | 989.32 | 2171.94 |        |         |        |         |

Manning's n Values num= 3

| Sta | n Val | Sta    | n Val | Sta    | n Val |
|-----|-------|--------|-------|--------|-------|
| 0   | .02   | 220.45 | .03   | 270.22 | .04   |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

| Sta    | Left   | Right | Lengths | Left | Channel | Right | Coeff | Contr. | Expan. |
|--------|--------|-------|---------|------|---------|-------|-------|--------|--------|
| 220.45 | 270.22 |       | 100     | 100  | 100     |       | .1    | .3     |        |

Ineffective Flow num= 3

| Sta L  | Sta R  | Elev    | Permanent |
|--------|--------|---------|-----------|
| 0      | 172.4  | 2170.25 | F         |
| 585.93 | 805.4  | 2171.94 | F         |
| 864.36 | 989.32 | 2171.94 | F         |

## CROSS SECTION

RIVER: Rancho  
REACH: lower RS: 5790

## INPUT

## Description:

| Station | Elevation | Data   | num=    | 92     | Sta     | Elev   | Sta     | Elev   | Sta     | Elev |
|---------|-----------|--------|---------|--------|---------|--------|---------|--------|---------|------|
| 0       | 2161.68   | 45.53  | 2162.28 | 84.94  | 2162.94 | 86.59  | 2165.15 | 87.23  | 2166.05 |      |
| 91.15   | 2166.29   | 91.38  | 2166.3  | 91.51  | 2166.31 | 95.43  | 2166.28 | 98.91  | 2166.27 |      |
| 142.85  | 2167.17   | 161.95 | 2167.53 | 165.3  | 2167.63 | 172.43 | 2167.79 | 192.34 | 2167.14 |      |
| 216.56  | 2166.3    | 217.24 | 2166.65 | 217.82 | 2166.97 | 220.45 | 2166.89 | 225    | 2162.42 |      |
| 237.63  | 2162.42   | 250    | 2162.42 | 255.41 | 2166.67 | 257.48 | 2166.77 | 270.22 | 2167.01 |      |
| 276.37  | 2167.15   | 312.31 | 2167.86 | 325.25 | 2168.06 | 343.81 | 2168.4  | 364.38 | 2168.62 |      |
| 378.28  | 2168.7    | 393.27 | 2168.44 | 403.02 | 2168.24 | 421.17 | 2168.06 | 454.46 | 2167.85 |      |
| 463.75  | 2167.81   | 510.99 | 2167.36 | 516.74 | 2167.22 | 535.89 | 2167.64 | 537.52 | 2167.72 |      |
| 537.95  | 2167.53   | 539.43 | 2166.79 | 579.74 | 2167.31 | 583.29 | 2168    | 585.05 | 2168.31 |      |
| 590.81  | 2168.89   | 595.68 | 2169.07 | 599.59 | 2169.13 | 607.79 | 2169.54 | 612.42 | 2169.73 |      |
| 614.87  | 2169.77   | 626.86 | 2170.18 | 631.22 | 2170.11 | 643.83 | 2170.18 | 644.96 | 2170.21 |      |
| 664.61  | 2170.24   | 665.25 | 2170.24 | 694.23 | 2170.34 | 700.59 | 2170.34 | 717.22 | 2170.4  |      |
| 726.57  | 2170.41   | 735.69 | 2170.34 | 742.97 | 2170.26 | 752.43 | 2170.3  | 756.95 | 2170.28 |      |
| 767.8   | 2170.39   | 769.68 | 2170.39 | 778.41 | 2170.28 | 783.18 | 2170.14 | 785.48 | 2170.13 |      |
| 787.89  | 2169.96   | 795.96 | 2168.75 | 797.13 | 2168.72 | 799.44 | 2168.5  | 801.25 | 2168.32 |      |
| 803.72  | 2167.78   | 804.64 | 2167.55 | 868.35 | 2168.28 | 869.12 | 2169.25 | 870.88 | 2171.38 |      |
| 872.31  | 2171.45   | 881.05 | 2171.86 | 892.52 | 2172.06 | 911.99 | 2172.1  | 912.32 | 2172.1  |      |
| 942.97  | 2172.38   | 949.17 | 2172.41 | 953.3  | 2172.26 | 968.63 | 2171.52 | 971.28 | 2171.4  |      |
| 979.34  | 2171.1    | 989.32 | 2171.1  |        |         |        |         |        |         |      |

Manning's n Values num= 3

| Sta | n Val | Sta    | n Val | Sta    | n Val |
|-----|-------|--------|-------|--------|-------|
| 0   | .02   | 220.45 | .03   | 257.48 | .04   |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

| Sta    | Left   | Right | Lengths | Left | Channel | Right | Coeff | Contr. | Expan. |
|--------|--------|-------|---------|------|---------|-------|-------|--------|--------|
| 220.45 | 257.48 |       | 110     | 110  | 110     |       | .1    | .3     |        |

Ineffective Flow num= 3

| Sta L  | Sta R  | Elev    | Permanent |
|--------|--------|---------|-----------|
| 0      | 172.4  | 2169.41 | F         |
| 585.93 | 805.4  | 2171.1  | F         |
| 864.36 | 989.32 | 2171.1  | F         |

## CULVERT

RIVER: Rancho  
REACH: lower RS: 5701

## INPUT

## Description:

Distance from Upstream XS = 5  
Deck/Roadway Width = 103  
Weir Coefficient = 2.6  
Upstream Deck/Roadway Coordinates

| num= | 2       | Sta  | Hi  | Cord    | Lo   | Cord | Sta | Hi | Cord | Lo | Cord |
|------|---------|------|-----|---------|------|------|-----|----|------|----|------|
| 0    | 2166.25 | 2161 | 300 | 2166.25 | 2161 |      |     |    |      |    |      |

## Upstream Bridge Cross Section Data

| Station | Elevation | Data  | num=    | 92    | Sta     | Elev  | Sta     | Elev  | Sta     | Elev |
|---------|-----------|-------|---------|-------|---------|-------|---------|-------|---------|------|
| 0       | 2161.68   | 45.53 | 2162.28 | 84.94 | 2162.94 | 86.59 | 2165.15 | 87.23 | 2166.05 |      |

|        |         |        |         |        |         |        |         |        |         |
|--------|---------|--------|---------|--------|---------|--------|---------|--------|---------|
| 91.15  | 2166.29 | 91.38  | 2166.3  | 91.51  | 2166.31 | 95.43  | 2166.28 | 98.91  | 2166.27 |
| 142.85 | 2167.17 | 161.95 | 2167.53 | 165.3  | 2167.63 | 172.43 | 2167.79 | 192.34 | 2167.14 |
| 216.56 | 2166.3  | 217.24 | 2166.65 | 217.82 | 2166.97 | 220.45 | 2166.89 | 225    | 2162.42 |
| 237.63 | 2162.42 | 250    | 2162.42 | 255.41 | 2166.67 | 257.48 | 2166.77 | 270.22 | 2167.01 |
| 276.37 | 2167.15 | 312.31 | 2167.86 | 325.25 | 2168.06 | 343.81 | 2168.4  | 364.38 | 2168.62 |
| 378.28 | 2168.7  | 393.27 | 2168.44 | 403.02 | 2168.24 | 421.17 | 2168.06 | 454.46 | 2167.85 |
| 463.75 | 2167.81 | 510.99 | 2167.36 | 516.74 | 2167.22 | 535.89 | 2167.64 | 537.52 | 2167.72 |
| 537.95 | 2167.53 | 539.43 | 2166.79 | 579.74 | 2167.31 | 583.29 | 2168    | 585.05 | 2168.31 |
| 590.81 | 2168.89 | 595.68 | 2169.07 | 599.59 | 2169.13 | 607.79 | 2169.54 | 612.42 | 2169.73 |
| 614.87 | 2169.77 | 626.86 | 2170.18 | 631.22 | 2170.11 | 643.83 | 2170.18 | 644.96 | 2170.21 |
| 664.61 | 2170.24 | 665.25 | 2170.24 | 694.23 | 2170.34 | 700.59 | 2170.34 | 717.22 | 2170.4  |
| 726.57 | 2170.41 | 735.69 | 2170.34 | 742.97 | 2170.26 | 752.43 | 2170.3  | 756.95 | 2170.28 |
| 767.8  | 2170.39 | 769.68 | 2170.39 | 778.41 | 2170.28 | 783.18 | 2170.14 | 785.48 | 2170.13 |
| 787.89 | 2169.96 | 795.96 | 2168.75 | 797.13 | 2168.72 | 799.44 | 2168.5  | 801.25 | 2168.32 |
| 803.72 | 2167.78 | 804.64 | 2167.55 | 868.35 | 2168.28 | 869.12 | 2169.25 | 870.88 | 2171.38 |
| 872.31 | 2171.45 | 881.05 | 2171.86 | 892.52 | 2172.06 | 911.99 | 2172.1  | 912.32 | 2172.1  |
| 942.97 | 2172.38 | 949.17 | 2172.41 | 953.3  | 2172.26 | 968.63 | 2171.52 | 971.28 | 2171.4  |
| 979.34 | 2171.1  | 989.32 | 2171.1  |        |         |        |         |        |         |

Manning's n Values num= 3

| Sta | n Val | Sta    | n Val | Sta    | n Val |
|-----|-------|--------|-------|--------|-------|
| 0   | .02   | 220.45 | .03   | 257.48 | .04   |

Bank Sta: Left Right Coeff Contr. Expan.

|        |        |  |    |    |
|--------|--------|--|----|----|
| 220.45 | 257.48 |  | .1 | .3 |
|--------|--------|--|----|----|

Ineffective Flow num= 3

| Sta L  | Sta R  | Elev    | Permanent |
|--------|--------|---------|-----------|
| 0      | 172.4  | 2169.41 | F         |
| 585.93 | 805.4  | 2171.1  | F         |
| 864.36 | 989.32 | 2171.1  | F         |

Downstream Deck/Roadway Coordinates

| Sta | Hi Cord | Lo Cord | Sta | Hi Cord | Lo Cord |
|-----|---------|---------|-----|---------|---------|
| 0   | 2166.25 | 2161    | 300 | 2166.25 | 2161    |

Downstream Bridge Cross Section Data

| Station | Elevation | Data   | num= 92 | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    | Sta | Elev |
|---------|-----------|--------|---------|--------|---------|--------|---------|--------|---------|-----|------|
| 0       | 2161.18   | 45.53  | 2161.78 | 84.94  | 2162.44 | 86.59  | 2164.65 | 87.23  | 2165.55 |     |      |
| 91.15   | 2165.79   | 91.38  | 2165.8  | 91.51  | 2165.81 | 95.43  | 2165.78 | 98.91  | 2165.77 |     |      |
| 142.85  | 2166.67   | 161.95 | 2167.03 | 165.3  | 2167.13 | 172.43 | 2167.29 | 192.34 | 2166.64 |     |      |
| 216.56  | 2165.8    | 217.24 | 2166.15 | 217.82 | 2166.47 | 220.45 | 2166.39 | 225    | 2161.92 |     |      |
| 237.63  | 2161.92   | 250    | 2161.92 | 255.41 | 2166.17 | 257.48 | 2166.27 | 270.22 | 2166.51 |     |      |
| 276.37  | 2166.65   | 312.31 | 2167.36 | 325.25 | 2167.56 | 343.81 | 2167.9  | 364.38 | 2168.12 |     |      |
| 378.28  | 2168.2    | 393.27 | 2167.94 | 403.02 | 2167.74 | 421.17 | 2167.56 | 454.46 | 2167.35 |     |      |
| 463.75  | 2167.31   | 510.99 | 2166.86 | 516.74 | 2166.72 | 535.89 | 2167.14 | 537.52 | 2167.22 |     |      |
| 537.95  | 2167.03   | 539.43 | 2166.29 | 579.74 | 2166.81 | 583.29 | 2167.5  | 585.05 | 2167.81 |     |      |
| 590.81  | 2168.39   | 595.68 | 2168.57 | 599.59 | 2168.63 | 607.79 | 2169.04 | 612.42 | 2169.23 |     |      |
| 614.87  | 2169.27   | 626.86 | 2169.68 | 631.22 | 2169.61 | 643.83 | 2169.68 | 644.96 | 2169.71 |     |      |
| 664.61  | 2169.74   | 665.25 | 2169.74 | 694.23 | 2169.84 | 700.59 | 2169.84 | 717.22 | 2169.9  |     |      |
| 726.57  | 2169.91   | 735.69 | 2169.84 | 742.97 | 2169.76 | 752.43 | 2169.8  | 756.95 | 2169.78 |     |      |
| 767.8   | 2169.89   | 769.68 | 2169.89 | 778.41 | 2169.78 | 783.18 | 2169.64 | 785.48 | 2169.63 |     |      |
| 787.89  | 2169.46   | 795.96 | 2168.25 | 797.13 | 2168.22 | 799.44 | 2168    | 801.25 | 2167.82 |     |      |
| 803.72  | 2167.28   | 804.64 | 2167.05 | 868.35 | 2167.78 | 869.12 | 2168.75 | 870.88 | 2170.88 |     |      |
| 872.31  | 2170.95   | 881.05 | 2171.36 | 892.52 | 2171.56 | 911.99 | 2171.6  | 912.32 | 2171.6  |     |      |
| 942.97  | 2171.88   | 949.17 | 2171.91 | 953.3  | 2171.76 | 968.63 | 2171.02 | 971.28 | 2170.9  |     |      |
| 979.34  | 2170.6    | 989.32 | 2170.6  |        |         |        |         |        |         |     |      |

Manning's n Values num= 3

| Sta | n Val | Sta    | n Val | Sta    | n Val |
|-----|-------|--------|-------|--------|-------|
| 0   | .02   | 220.45 | .03   | 255.41 | .04   |

Bank Sta: Left Right Coeff Contr. Expan.

|        |        |  |    |    |
|--------|--------|--|----|----|
| 220.45 | 255.41 |  | .1 | .3 |
|--------|--------|--|----|----|

Ineffective Flow num= 3

| Sta L  | Sta R  | Elev    | Permanent |
|--------|--------|---------|-----------|
| 0      | 172.4  | 2168.91 | F         |
| 585.93 | 805.4  | 2167.9  | F         |
| 864.36 | 989.32 | 2170.6  | F         |

Upstream Embankment side slope = 0 horiz. to 1.0 vertical  
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical  
 Maximum allowable submergence for weir flow = .95  
 Elevation at which weir flow begins =  
 Energy head used in spillway design =  
 Spillway height used in design =  
 Weir crest shape = Broad Crested

Number of Culverts = 1

| Culvert Name                                  | Shape   | Rise               | Span     |
|-----------------------------------------------|---------|--------------------|----------|
| Culvert #1                                    | Ellipse | 3.1                | 4.9      |
| FHWA Chart # 29- Horizontal Ellipse; Concrete |         |                    |          |
| FHWA Scale # 1 - Square edge with headwall    |         |                    |          |
| Solution Criteria = Highest U.S. EG           |         |                    |          |
| Culvert Upstrm Dist                           | Length  | Top n              | Bottom n |
| 5                                             | 103     | .012               | .012     |
| Depth Blocked                                 |         | Entrance Loss Coef |          |
| 0                                             |         | .5                 |          |
| Exit Loss Coef                                |         | 1                  |          |

Number of Barrels = 4

Upstream Elevation = 2162.42  
 Centerline Stations  
     Sta.    Sta.    Sta.    Sta.  
     227     233     239     245  
 Downstream Elevation = 2161.92  
 Centerline Stations  
     Sta.    Sta.    Sta.    Sta.  
     227     233     239     245

## CROSS SECTION

RIVER: Rancho  
 REACH: lower               RS: 5680

## INPUT

Description:

| Station | Elevation | Data   | num=    | 92     |         |        |         |        |         |  |
|---------|-----------|--------|---------|--------|---------|--------|---------|--------|---------|--|
| Sta     | Elev      | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    |  |
| 0       | 2161.18   | 45.53  | 2161.78 | 84.94  | 2162.44 | 86.59  | 2164.65 | 87.23  | 2165.55 |  |
| 91.15   | 2165.79   | 91.38  | 2165.8  | 91.51  | 2165.81 | 95.43  | 2165.78 | 98.91  | 2165.77 |  |
| 142.85  | 2166.67   | 161.95 | 2167.03 | 165.3  | 2167.13 | 172.43 | 2167.29 | 192.34 | 2166.64 |  |
| 216.56  | 2165.8    | 217.24 | 2166.15 | 217.82 | 2166.47 | 220.45 | 2166.39 | 225    | 2161.92 |  |
| 237.63  | 2161.92   | 250    | 2161.92 | 255.41 | 2166.17 | 257.48 | 2166.27 | 270.22 | 2166.51 |  |
| 276.37  | 2166.65   | 312.31 | 2167.36 | 325.25 | 2167.56 | 343.81 | 2167.9  | 364.38 | 2168.12 |  |
| 378.28  | 2168.2    | 393.27 | 2167.94 | 403.02 | 2167.74 | 421.17 | 2167.56 | 454.46 | 2167.35 |  |
| 463.75  | 2167.31   | 510.99 | 2166.86 | 516.74 | 2166.72 | 535.89 | 2167.14 | 537.52 | 2167.22 |  |
| 537.95  | 2167.03   | 539.43 | 2166.29 | 579.74 | 2166.81 | 583.29 | 2167.5  | 585.05 | 2167.81 |  |
| 590.81  | 2168.39   | 595.68 | 2168.57 | 599.59 | 2168.63 | 607.79 | 2169.04 | 612.42 | 2169.23 |  |
| 614.87  | 2169.27   | 626.86 | 2169.68 | 631.22 | 2169.61 | 643.83 | 2169.68 | 644.96 | 2169.71 |  |
| 664.61  | 2169.74   | 665.25 | 2169.74 | 694.23 | 2169.84 | 700.59 | 2169.84 | 717.22 | 2169.9  |  |
| 726.57  | 2169.91   | 735.69 | 2169.84 | 742.97 | 2169.76 | 752.43 | 2169.8  | 756.95 | 2169.78 |  |
| 767.8   | 2169.89   | 769.68 | 2169.89 | 778.41 | 2169.78 | 783.18 | 2169.64 | 785.48 | 2169.63 |  |
| 787.89  | 2169.46   | 795.96 | 2168.25 | 797.13 | 2168.22 | 799.44 | 2168    | 801.25 | 2167.82 |  |
| 803.72  | 2167.28   | 804.64 | 2167.05 | 868.35 | 2167.78 | 869.12 | 2168.75 | 870.88 | 2170.88 |  |
| 872.31  | 2170.95   | 881.05 | 2171.36 | 892.52 | 2171.56 | 911.99 | 2171.6  | 912.32 | 2171.6  |  |
| 942.97  | 2171.88   | 949.17 | 2171.91 | 953.3  | 2171.76 | 968.63 | 2171.02 | 971.28 | 2170.9  |  |
| 979.34  | 2170.6    | 989.32 | 2170.6  |        |         |        |         |        |         |  |

| Manning's n Values |       | num=   | 3     |
|--------------------|-------|--------|-------|
| Sta                | n Val | Sta    | n Val |
| 0                  | .02   | 220.45 | .03   |
|                    |       | 255.41 | .04   |

| Bank Sta:        | Left   | Right   | Lengths:  | Left Channel | Right | Coeff | Contr. | Expan. |
|------------------|--------|---------|-----------|--------------|-------|-------|--------|--------|
|                  | 220.45 | 255.41  |           | 120          | 120   |       | .1     | .3     |
| Ineffective Flow |        | num=    | 3         |              |       |       |        |        |
| Sta L            | Sta R  | Elev    | Permanent |              |       |       |        |        |
| 0                | 172.4  | 2168.91 | F         |              |       |       |        |        |
| 585.93           | 805.4  | 2167.9  | F         |              |       |       |        |        |
| 864.36           | 989.32 | 2170.6  | F         |              |       |       |        |        |

## CROSS SECTION

RIVER: Rancho  
 REACH: lower               RS: 5560.176

## INPUT

Description: 838 feet north of Coran

| Station | Elevation | Data   | num=    | 98     |         |        |         |        |         |  |
|---------|-----------|--------|---------|--------|---------|--------|---------|--------|---------|--|
| Sta     | Elev      | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    |  |
| 0       | 2160.18   | 45.53  | 2160.78 | 84.94  | 2161.44 | 86.59  | 2163.65 | 87.23  | 2164.55 |  |
| 91.15   | 2164.79   | 91.38  | 2164.8  | 91.51  | 2164.81 | 95.43  | 2164.78 | 98.91  | 2164.77 |  |
| 142.85  | 2165.67   | 161.95 | 2166.03 | 165.3  | 2166.13 | 172.43 | 2166.29 | 192.34 | 2165.64 |  |
| 216.56  | 2164.8    | 217.24 | 2165.15 | 217.82 | 2165.47 | 220.45 | 2165.39 | 225.26 | 2165.29 |  |
| 225.82  | 2165.28   | 235.11 | 2161.93 | 237.63 | 2160.92 | 242.53 | 2162.58 | 243.15 | 2162.81 |  |
| 244.61  | 2163.53   | 247.66 | 2164.93 | 252.33 | 2165.03 | 255.41 | 2165.17 | 257.48 | 2165.27 |  |
| 270.22  | 2165.51   | 276.37 | 2165.65 | 312.31 | 2166.36 | 325.25 | 2166.56 | 343.81 | 2166.9  |  |
| 364.38  | 2167.12   | 378.28 | 2167.2  | 393.27 | 2166.94 | 403.02 | 2166.74 | 421.17 | 2166.56 |  |
| 454.46  | 2166.35   | 463.75 | 2166.31 | 510.99 | 2165.86 | 516.74 | 2165.72 | 535.89 | 2166.14 |  |
| 537.52  | 2166.22   | 537.95 | 2166.03 | 539.43 | 2165.29 | 579.74 | 2165.81 | 583.29 | 2166.5  |  |
| 585.05  | 2166.81   | 590.81 | 2167.39 | 595.68 | 2167.57 | 599.59 | 2167.63 | 607.79 | 2168.04 |  |
| 612.42  | 2168.23   | 614.87 | 2168.27 | 626.86 | 2168.68 | 631.22 | 2168.61 | 643.83 | 2168.68 |  |
| 644.96  | 2168.71   | 664.61 | 2168.74 | 665.25 | 2168.74 | 694.23 | 2168.84 | 700.59 | 2168.84 |  |
| 717.22  | 2168.9    | 726.57 | 2168.91 | 735.69 | 2168.84 | 742.97 | 2168.76 | 752.43 | 2168.8  |  |
| 756.95  | 2168.78   | 767.8  | 2168.89 | 769.68 | 2168.89 | 778.41 | 2168.78 | 783.18 | 2168.64 |  |
| 785.48  | 2168.63   | 787.89 | 2168.46 | 795.96 | 2167.25 | 797.13 | 2167.22 | 799.44 | 2167    |  |
| 801.25  | 2166.82   | 803.72 | 2166.28 | 804.64 | 2166.05 | 868.35 | 2166.78 | 869.12 | 2167.75 |  |
| 870.88  | 2169.88   | 872.31 | 2169.95 | 881.05 | 2170.36 | 892.52 | 2170.56 | 911.99 | 2170.6  |  |
| 912.32  | 2170.6    | 942.97 | 2170.88 | 949.17 | 2170.91 | 953.3  | 2170.76 | 968.63 | 2170.02 |  |
| 971.28  | 2169.9    | 979.34 | 2169.6  | 989.32 | 2169.6  |        |         |        |         |  |

| Manning's n Values |       | num=   | 3     |
|--------------------|-------|--------|-------|
| Sta                | n Val | Sta    | n Val |
| 0                  | .02   | 225.26 | .03   |
|                    |       | 276.37 | .04   |

| Bank Sta:        | Left   | Right  | Lengths: | Left Channel | Right   | Coeff | Contr. | Expan. |
|------------------|--------|--------|----------|--------------|---------|-------|--------|--------|
|                  | 225.26 | 276.37 |          | 1308.86      | 1305.57 |       | .1     | .3     |
| Ineffective Flow |        | num=   | 3        |              |         |       |        |        |

| Sta L  | Sta R  | Elev     | Permanent |
|--------|--------|----------|-----------|
| 0      | 172.4  | 2167.91  | F         |
| 585.93 | 805.42 | 2166.901 | F         |
| 864.36 | 989.32 | 2169.599 | F         |

## CROSS SECTION

RIVER: Rancho

REACH: lower RS: 4255.943

## INPUT

Description: 487 feet south of Coran

| Station | Elevation | Data    | num=    | 166     |         |         |         |         |         |
|---------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|
| Sta     | Elev      | Sta     | Elev    | Sta     | Elev    | Sta     | Elev    | Sta     | Elev    |
| 0       | 2146.41   | .88     | 2146.41 | 51.46   | 2146.68 | 101.79  | 2146.7  | 105.28  | 2146.71 |
| 111.96  | 2147.6    | 119.32  | 2148.63 | 131.34  | 2148.41 | 133.26  | 2148.37 | 154.43  | 2148.92 |
| 175.25  | 2149.18   | 177.92  | 2149.17 | 178.21  | 2149.17 | 184.33  | 2149.16 | 188.58  | 2149.26 |
| 189.54  | 2149.28   | 223.48  | 2148.59 | 226.86  | 2148.51 | 228.95  | 2148.59 | 233.9   | 2148.75 |
| 235.17  | 2148.79   | 237.99  | 2148.62 | 257.07  | 2148.14 | 257.22  | 2148.06 | 257.51  | 2147.9  |
| 258     | 2147.64   | 261.69  | 2147.35 | 262.37  | 2147.3  | 263.07  | 2147.33 | 288.09  | 2147.57 |
| 288.74  | 2147.57   | 299.07  | 2147.82 | 300.09  | 2147.83 | 315.55  | 2148.25 | 318.35  | 2148.36 |
| 319.15  | 2148.37   | 319.87  | 2148.37 | 321.56  | 2148.4  | 327.35  | 2148.47 | 327.5   | 2148.48 |
| 327.91  | 2148.5    | 334.57  | 2148.67 | 335.26  | 2148.68 | 338.51  | 2148.82 | 345.68  | 2148.8  |
| 350.15  | 2148.81   | 352.72  | 2148.8  | 353.64  | 2148.78 | 356.75  | 2148.85 | 357.27  | 2148.86 |
| 358.82  | 2148.87   | 380.56  | 2149.4  | 392.46  | 2149.43 | 400.63  | 2149.49 | 403.39  | 2149.52 |
| 425.21  | 2149.96   | 427.32  | 2149.98 | 455.51  | 2150.11 | 456.12  | 2150.19 | 457.56  | 2150.23 |
| 457.94  | 2150.23   | 458.29  | 2150.24 | 463.82  | 2150.38 | 465.38  | 2150.47 | 493.33  | 2151.93 |
| 502.33  | 2152.53   | 510.51  | 2152.82 | 514.05  | 2152.94 | 518.18  | 2153.09 | 521.09  | 2153.16 |
| 522.68  | 2153.38   | 523.17  | 2153.42 | 530.07  | 2153.74 | 531.44  | 2153.79 | 534.55  | 2154.04 |
| 545.92  | 2154.24   | 551.26  | 2154.51 | 557.8   | 2154.68 | 560.49  | 2154.5  | 566.26  | 2154.32 |
| 566.72  | 2154.41   | 568.49  | 2154.69 | 572.53  | 2155.38 | 573.71  | 2155.53 | 576.64  | 2155.05 |
| 581.23  | 2154.33   | 586.23  | 2154.3  | 596.08  | 2153.51 | 598.09  | 2152.98 | 599.56  | 2152.77 |
| 600.64  | 2152.79   | 601.75  | 2152.8  | 601.94  | 2152.83 | 603.73  | 2153.28 | 604.99  | 2153.57 |
| 607.47  | 2153.63   | 623.4   | 2154.48 | 629.11  | 2154.55 | 630.85  | 2154.3  | 632.72  | 2154.12 |
| 638.98  | 2153.44   | 639.04  | 2153.44 | 641.09  | 2153.36 | 641.51  | 2153.36 | 654.93  | 2152.97 |
| 662.57  | 2152.71   | 668.79  | 2152.91 | 682.15  | 2153.26 | 685.07  | 2153.22 | 690.54  | 2153.2  |
| 695.58  | 2153.2    | 698.59  | 2153.62 | 699.17  | 2153.71 | 719.94  | 2154.09 | 732.15  | 2154.28 |
| 746.51  | 2154.21   | 774.97  | 2154.36 | 778.72  | 2154.42 | 800.39  | 2155.12 | 811.57  | 2155.35 |
| 832.5   | 2156.04   | 854.79  | 2156.3  | 857.72  | 2156.37 | 859.49  | 2156.36 | 934.74  | 2157.2  |
| 943.24  | 2157.26   | 967.4   | 2157.73 | 979.28  | 2157.8  | 1000.16 | 2157.81 | 1023.32 | 2157.67 |
| 1037.64 | 2157.25   | 1037.92 | 2157.24 | 1041.67 | 2157.25 | 1054.92 | 2157.48 | 1076.27 | 2157.91 |
| 1077.09 | 2157.91   | 1081.17 | 2157.89 | 1082.08 | 2157.91 | 1085.86 | 2157.93 | 1086.13 | 2157.94 |
| 1086.22 | 2157.94   | 1086.94 | 2157.97 | 1087.94 | 2158    | 1111.51 | 2158.83 | 1114.99 | 2158.96 |
| 1115.88 | 2158.99   | 1125.11 | 2159.15 | 1153.13 | 2159.78 | 1162.85 | 2159.89 | 1168.16 | 2159.9  |
| 1258.08 | 2160.4    | 1259.16 | 2160.9  | 1260.83 | 2161.54 | 1271.54 | 2161.5  | 1278.23 | 2161.5  |
| 1280.35 | 2161.54   | 1344.72 | 2162.55 | 1364.92 | 2162.78 | 1375.92 | 2162.84 | 1385.11 | 2162.84 |
| 1414.09 | 2162.88   | 1440.68 | 2163    | 1445.08 | 2163.07 | 1466.8  | 2163.54 | 1474.19 | 2163.77 |
| 1482.05 | 2164.05   |         |         |         |         |         |         |         |         |

| Manning's n | Values | num=   | 3     |
|-------------|--------|--------|-------|
| Sta         | n Val  | Sta    | n Val |
| 0           | .02    | 237.99 | .03   |
|             |        | 335.26 | .04   |

| Bank Sta: | Left   | Right  | Lengths: | Left    | Channel | Right   | Coeff | Contr. | Expan. |
|-----------|--------|--------|----------|---------|---------|---------|-------|--------|--------|
|           | 237.99 | 335.26 |          | 1414.64 | 1415.76 | 1416.72 | .1    | .3     |        |

| Ineffective Flow | num=    | 3        |
|------------------|---------|----------|
| Sta L            | Sta R   | Elev     |
| 0                | 188.58  | 2155.49  |
| 400              | 642.92  | 2155     |
| 706.41           | 1482.05 | 2164.045 |

| Permanent |
|-----------|
| F         |
| F         |
| F         |

## CROSS SECTION

RIVER: Rancho

REACH: lower RS: 2839.724

## INPUT

Description:

| Station | Elevation | Data    | num=    | 99      |         |         |         |         |         |
|---------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|
| Sta     | Elev      | Sta     | Elev    | Sta     | Elev    | Sta     | Elev    | Sta     | Elev    |
| 0       | 2124.35   | 9.21    | 2124.52 | 25.26   | 2125.41 | 31.26   | 2125.72 | 34.63   | 2125.83 |
| 44.78   | 2125.9    | 49.5    | 2125.95 | 62.9    | 2125.96 | 89.86   | 2126.66 | 95.24   | 2128.02 |
| 99.92   | 2129.65   | 105.66  | 2129.57 | 114.69  | 2129.76 | 165.6   | 2129.63 | 191.48  | 2129.95 |
| 197.8   | 2130      | 209.72  | 2130.31 | 221.9   | 2130.88 | 231.08  | 2131.36 | 249.66  | 2131.95 |
| 264.82  | 2131.76   | 278.96  | 2131.81 | 307.55  | 2132.03 | 313.23  | 2131.97 | 335.89  | 2131.77 |
| 338.5   | 2131.57   | 348.32  | 2131.14 | 349.73  | 2131.09 | 350.31  | 2131.06 | 384.59  | 2131.07 |
| 409.55  | 2131.63   | 443.48  | 2131.12 | 444.61  | 2131.11 | 445.56  | 2131.12 | 449.48  | 2131.21 |
| 461.3   | 2131.49   | 472.28  | 2131.68 | 475.99  | 2131.8  | 494.26  | 2132.05 | 520.2   | 2132.35 |
| 534.69  | 2132.45   | 541.23  | 2132.53 | 552.75  | 2132.51 | 554.48  | 2132.5  | 587.54  | 2132.62 |
| 632.81  | 2133.3    | 633.91  | 2133.31 | 635.43  | 2133.33 | 636.72  | 2133.37 | 656.3   | 2133.59 |
| 659.21  | 2133.73   | 663.15  | 2133.93 | 667.16  | 2133.97 | 681.01  | 2134.05 | 707.66  | 2134.14 |
| 717.76  | 2134.38   | 726.12  | 2134.4  | 732.98  | 2134.45 | 784.65  | 2135.36 | 794.42  | 2135.43 |
| 836.24  | 2135.66   | 842.66  | 2135.73 | 857.07  | 2135.75 | 870.53  | 2136.65 | 875.16  | 2136.81 |
| 881.97  | 2136.66   | 895.42  | 2136.08 | 905.73  | 2136.15 | 912.83  | 2136.24 | 939.75  | 2136.26 |
| 984.62  | 2136.61   | 997.32  | 2136.86 | 1009.03 | 2137.22 | 1018.92 | 2137.6  | 1039.4  | 2138.06 |
| 1039.76 | 2138.06   | 1040.62 | 2138.07 | 1071.9  | 2138.71 | 1090.11 | 2139.35 | 1092.58 | 2139.41 |
| 1093.23 | 2139.82   | 1096.65 | 2141.68 | 1099.43 | 2141.57 | 1112.84 | 2141.5  | 1142.56 | 2141.86 |



1162.06 2142.16 1183.48 2142.42 1215.49 2143.04 1226.07 2143.55 1249.56 2144.52  
 1252.42 2144.57 1255.08 2144.61 1264.48 2144.96 1284.85 2145.52 1291.78 2145.76  
 1305.34 2146.26 1326.75 2147.1 1331.35 2147.27 1342.55 2148

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 0 .02 349.73 .03 449.48 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 349.73 449.48 1115.34 1115.82 1116.3 .1 .3  
 Ineffective Flow num= 2  
 Sta L Sta R Elev Permanent  
 0 311 2141.69 F  
 459.35 1342.55 2147.996 F

## CROSS SECTION

RIVER: Rancho  
 REACH: lower RS: 1723.771

## INPUT

## Description:

Station Elevation Data num= 77  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 0 2115.64 9.71 2115.09 18.22 2115.09 20.56 2115.14 76.17 2115.63  
 117.12 2115.77 127.91 2115.88 165.4 2116.42 185.88 2116.5 237.16 2116.92  
 239.36 2116.97 254.89 2117.07 259.81 2117.09 264.42 2117.13 266.68 2117.14  
 267.33 2117.17 269.04 2117.47 273.72 2118 275.21 2118.03 277.56 2118.03  
 290.03 2118.08 295.48 2118.15 298.89 2118.15 307.98 2118.25 309.08 2118.25  
 314.29 2118.3 315.8 2118.04 317.7 2117.78 332.58 2118.18 339.51 2118.38  
 341.1 2118.43 341.69 2118.47 345.42 2119.24 351.35 2119.04 354.5 2119.17  
 389.24 2120.11 390.01 2120.13 392.13 2120.06 398.87 2119.82 415.26 2119.47  
 436.71 2119.18 445.68 2119.06 491.44 2119.71 492.48 2119.73 493.8 2119.76  
 498.23 2119.66 549.53 2119.13 564.04 2119.27 565.94 2119.32 567.7 2120.52  
 574.62 2123.68 577.36 2123.56 581.39 2123.28 597.11 2123.11 601.98 2123.04  
 603.7 2123.02 632.49 2122.37 645.22 2122.28 645.93 2122.27 646.1 2122.07  
 647.88 2119.86 653.7 2119.79 658.65 2119.7 663.06 2119.79 663.69 2119.8  
 663.77 2119.8 675.57 2120.04 675.78 2120.05 676.12 2120.05 689.04 2120.29  
 689.37 2120.3 708.8 2120.35 730.03 2120.23 750.84 2120.55 758.71 2120.72  
 777.56 2120.97 779.62 2121.06

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 0 .03 339.51 .03 491.44 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 339.51 491.44 815.8 815.8 815.85 .1 .3  
 Ineffective Flow num= 2  
 Sta L Sta R Elev Permanent  
 0 389 2120.67 F  
 568 779.62 2121.063 F

## CROSS SECTION

RIVER: Rancho  
 REACH: lower RS: 907.9108

## INPUT

## Description:

Station Elevation Data num= 145  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 0 2109.14 1.51 2109.17 5.24 2109.23 6.69 2109.23 7.92 2109.24  
 22.22 2109.29 22.53 2109.29 24.36 2109.3 33.52 2109.61 35.84 2109.72  
 39.33 2109.84 43.71 2110.01 48.74 2110.11 52.2 2110.15 56.42 2110.18  
 57.93 2110.21 67.82 2110.39 92.78 2110.79 96.39 2110.83 97.64 2110.81  
 106.59 2110.71 108.2 2110.65 110.77 2110.64 111.49 2110.62 111.64 2110.61  
 111.86 2110.6 120.1 2110 156.48 2110.41 160.62 2110.41 175.01 2110.75  
 177.57 2110.83 225.58 2111.31 229.37 2111.31 240.74 2111.8 264.44 2112.57  
 268.09 2112.63 268.21 2112.63 271.43 2112.59 273.06 2112.54 274.63 2112.55  
 274.71 2112.55 275.5 2112.56 320.12 2113.43 338.28 2113.11 362.2 2112.92  
 368.35 2112.92 368.44 2112.92 370.28 2112.93 427.27 2112.42 435.53 2112.28  
 465.59 2111.98 468.81 2111.93 469.99 2111.88 473.59 2111.8 474.23 2111.8  
 477.03 2111.77 477.49 2111.77 487.67 2111.88 520.14 2111.9 521.13 2111.92  
 521.5 2111.92 522.6 2111.93 522.99 2111.94 524.2 2111.95 524.59 2111.96  
 525.89 2111.97 526.3 2111.98 527.63 2111.98 528.04 2111.99 531.21 2111.99  
 562.73 2112.22 600.61 2112.48 647.22 2112.76 656.59 2112.83 684.47 2112.99  
 718.57 2113.24 722.33 2113.24 723.21 2113.25 723.99 2113.25 724.88 2113.27  
 727.31 2113.27 728.91 2113.29 730.43 2113.29 731.18 2113.3 731.85 2113.3  
 732.53 2113.31 733.15 2113.31 752.88 2113.38 776.19 2113.39 776.97 2113.4  
 777.59 2113.41 778.43 2113.42 779.85 2113.44 781.48 2113.46 782.39 2113.48  
 783.16 2113.49 785.07 2113.53 793.01 2113.55 808.7 2113.77 812.48 2113.83  
 829.14 2114.06 846.28 2114.37 850.39 2114.42 874.48 2114.75 888.3 2114.98  
 902.78 2115.18 916.07 2115.4 930.75 2115.6 982.33 2115.99 984.38 2115.97  
 985.89 2115.97 986.37 2115.98 987.36 2115.97 990.07 2115.97 990.47 2115.96  
 991.25 2115.97 1021.35 2116.08 1037.46 2116.03 1038.35 2116.04 1038.74 2116.05  
 1040.14 2116.05 1040.6 2116.07 1042.81 2116.07 1043.26 2116.08 1043.74 2116.1  
 1044.93 2116.11 1046.16 2116.11 1047.38 2116.12 1059.3 2116.18 1142.42 2116.98

|         |         |         |         |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 1218.31 | 2117.34 | 1233.63 | 2117.5  | 1234.84 | 2117.5  | 1248.59 | 2117.6  | 1254.27 | 2117.6  |
| 1255.65 | 2117.61 | 1256.95 | 2117.61 | 1288.17 | 2117.91 | 1292.48 | 2118.02 | 1297.13 | 2118.05 |
| 1309.66 | 2118.17 | 1355.26 | 2118.3  | 1357.74 | 2118.32 | 1433.99 | 2119.09 | 1452.91 | 2119.21 |

Manning's n Values num= 3

| Sta | n Val | Sta    | n Val | Sta    | n Val |
|-----|-------|--------|-------|--------|-------|
| 0   | .02   | 268.21 | .03   | 368.35 | .04   |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 268.21 368.35 867.85 868.75 869.7 .1 .3

Ineffective Flow num= 2

| Sta L | Sta R   | Elev     | Permanent |
|-------|---------|----------|-----------|
| 0     | 320     | 2116.72  | F         |
| 602   | 1452.91 | 2119.205 | F         |

## CROSS SECTION

RIVER: Rancho  
 REACH: lower RS: 39.12192

## INPUT

## Description:

Station Elevation Data num= 44

| Sta    | Elev    | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    | Sta    | Elev    |
|--------|---------|--------|---------|--------|---------|--------|---------|--------|---------|
| 0      | 2105.71 | 1.85   | 2105.51 | 36.31  | 2105.9  | 44.11  | 2106.98 | 48.42  | 2107.1  |
| 56.25  | 2107.22 | 79.97  | 2107.55 | 82.1   | 2107.56 | 122.23 | 2107.65 | 126.14 | 2107.79 |
| 127.25 | 2107.8  | 131.64 | 2107.87 | 148.17 | 2108.09 | 150.04 | 2108.41 | 150.11 | 2108.43 |
| 156.77 | 2107.57 | 157.79 | 2107.45 | 191.16 | 2108.18 | 191.98 | 2108.2  | 195.74 | 2108.39 |
| 205.06 | 2108.26 | 206.22 | 2108.14 | 240.76 | 2107.7  | 244.83 | 2107.7  | 246.34 | 2107.69 |
| 247.89 | 2108.15 | 249.58 | 2108.63 | 272.79 | 2108.58 | 276.02 | 2108.56 | 280.86 | 2108.55 |
| 374.18 | 2109.04 | 452.12 | 2108.85 | 455.53 | 2108.85 | 477.25 | 2108.78 | 479.59 | 2108.8  |
| 535.62 | 2108.84 | 542.49 | 2108.81 | 546.85 | 2108.68 | 595.4  | 2108.27 | 620.22 | 2108.18 |
| 672.43 | 2108.21 | 758.2  | 2108.98 | 804.11 | 2109.11 | 810.18 | 2109.16 |        |         |

Manning's n Values num= 3

| Sta | n Val | Sta    | n Val | Sta    | n Val |
|-----|-------|--------|-------|--------|-------|
| 0   | .02   | 150.04 | .03   | 244.83 | .04   |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 150.04 244.83 43.37 41.89 37.51 .1 .3

Ineffective Flow num= 2

| Sta L  | Sta R  | Elev    | Permanent |
|--------|--------|---------|-----------|
| 0      | 150.04 | 2111.76 | F         |
| 248.08 | 810.18 | 2112    | F         |

## SUMMARY OF MANNING'S N VALUES

River:Rancho

| Reach | River Sta. | n1      | n2  | n3  |
|-------|------------|---------|-----|-----|
| lower | 17703.33   | .02     | .03 | .04 |
| lower | 17497.06   | .02     | .03 | .04 |
| lower | 17173.04   | .02     | .03 | .04 |
| lower | 16542.69   | .02     | .03 | .03 |
| lower | 16236.51   | .02     | .03 | .04 |
| lower | 15706.68   | .02     | .03 | .04 |
| lower | 15499.54   | .04     | .03 | .03 |
| lower | 15031.36   | .02     | .03 | .04 |
| lower | 14411.04   | .02     | .03 | .02 |
| lower | 13841.4    | .02     | .03 | .04 |
| lower | 13754.98   | .02     | .03 | .04 |
| lower | 13533.66   | .02     | .03 | .04 |
| lower | 13400      | Culvert |     |     |
| lower | 13376.99   | .02     | .03 | .04 |
| lower | 13038.48   | .02     | .03 | .04 |
| lower | 12931.09   | .02     | .03 | .04 |
| lower | 12719.33   | .02     | .03 | .04 |
| lower | 12700      | Culvert |     |     |
| lower | 12609.91   | .02     | .03 | .04 |
| lower | 12394.78   | .02     | .03 | .04 |
| lower | 12380      | Culvert |     |     |
| lower | 12306.29   | .02     | .03 | .04 |
| lower | 12237.41   | .02     | .03 | .04 |
| lower | 12152.03   | .02     | .03 | .04 |
| lower | 12100      | Culvert |     |     |
| lower | 12055.63   | .02     | .03 | .04 |
| lower | 11687.51   | .02     | .03 | .04 |
| lower | 11615      | Culvert |     |     |
| lower | 11608.09   | .02     | .03 | .04 |
| lower | 11482.64   | .02     | .03 | .04 |
| lower | 11346.39   | .02     | .03 | .04 |
| lower | 11200      | .02     | .03 | .04 |
| lower | 10302.11   | .02     | .03 | .04 |
| lower | 9875.193   | .02     | .03 | .04 |
| lower | 9730.641   | .02     | .03 | .04 |

|       |          |         |     |     |
|-------|----------|---------|-----|-----|
| lower | 9032.391 | .02     | .03 | .04 |
| lower | 8935.525 | .02     | .03 | .04 |
| lower | 8765.933 | .02     | .03 | .04 |
| lower | 7977.189 | .02     | .03 | .04 |
| lower | 7607.411 | .02     | .03 | .04 |
| lower | 7469.225 | .02     | .03 | .04 |
| lower | 7405     | Culvert |     |     |
| lower | 7400     | .02     | .03 | .04 |
| lower | 7280.748 | .02     | .03 | .04 |
| lower | 7255     | Culvert |     |     |
| lower | 7190.137 | .02     | .03 | .04 |
| lower | 6800     | .02     | .03 | .04 |
| lower | 6584.101 | .02     | .03 | .04 |
| lower | 5890     | .02     | .03 | .04 |
| lower | 5790     | .02     | .03 | .04 |
| lower | 5701     | Culvert |     |     |
| lower | 5680     | .02     | .03 | .04 |
| lower | 5560.176 | .02     | .03 | .04 |
| lower | 4255.943 | .02     | .03 | .04 |
| lower | 2839.724 | .02     | .03 | .04 |
| lower | 1723.771 | .03     | .03 | .04 |
| lower | 907.9108 | .02     | .03 | .04 |
| lower | 39.12192 | .02     | .03 | .04 |

## SUMMARY OF REACH LENGTHS

River: Rancho

| Reach | River Sta. | Left    | Channel | Right   |
|-------|------------|---------|---------|---------|
| lower | 17703.33   | 207.42  | 205.22  | 203.22  |
| lower | 17497.06   | 323.48  | 324.72  | 325.82  |
| lower | 17173.04   | 630.28  | 630.4   | 630.48  |
| lower | 16542.69   | 306.18  | 306.18  | 306.18  |
| lower | 16236.51   | 530.21  | 529.83  | 529.49  |
| lower | 15706.68   | 207.14  | 207.14  | 207.14  |
| lower | 15499.54   | 469.33  | 468.15  | 467.1   |
| lower | 15031.36   | 620.28  | 620.4   | 620.52  |
| lower | 14411.04   | 569.67  | 569.7   | 569.7   |
| lower | 13841.4    | 86.42   | 86.42   | 86.42   |
| lower | 13754.98   | 220.1   | 221.27  | 222.31  |
| lower | 13533.66   | 156.67  | 156.67  | 156.67  |
| lower | 13400      | Culvert |         |         |
| lower | 13376.99   | 338.51  | 338.51  | 338.51  |
| lower | 13038.48   | 108.18  | 107.17  | 106.27  |
| lower | 12931.09   | 209.82  | 212.15  | 214.23  |
| lower | 12719.33   | 110.05  | 109.33  | 108.69  |
| lower | 12700      | Culvert |         |         |
| lower | 12609.91   | 217.2   | 214.98  | 213.01  |
| lower | 12394.78   | 88.44   | 88.52   | 88.59   |
| lower | 12380      | Culvert |         |         |
| lower | 12306.29   | 68.05   | 68.95   | 69.75   |
| lower | 12237.41   | 85.77   | 85.39   | 85.04   |
| lower | 12152.03   | 97.09   | 96.42   | 95.82   |
| lower | 12100      | Culvert |         |         |
| lower | 12055.63   | 368.12  | 368.26  | 368.37  |
| lower | 11687.51   | 79.27   | 79.37   | 79.45   |
| lower | 11615      | Culvert |         |         |
| lower | 11608.09   | 125.7   | 125.36  | 125.06  |
| lower | 11482.64   | 138.85  | 136.26  | 134     |
| lower | 11346.39   | 146.39  | 146.39  | 146.39  |
| lower | 11200      | 897.89  | 897.89  | 897.89  |
| lower | 10302.11   | 426.91  | 426.91  | 426.91  |
| lower | 9875.193   | 149.31  | 144.89  | 141.18  |
| lower | 9730.641   | 698.52  | 698.08  | 697.8   |
| lower | 9032.391   | 94.56   | 96.88   | 98.74   |
| lower | 8935.525   | 170.75  | 169.54  | 168.59  |
| lower | 8765.933   | 790.28  | 788.36  | 787     |
| lower | 7977.189   | 369.778 | 369.778 | 369.778 |
| lower | 7607.411   | 139.37  | 138.14  | 136.83  |
| lower | 7469.225   | 69.2    | 69.2    | 69.2    |
| lower | 7405       | Culvert |         |         |
| lower | 7400       | 119.1   | 119.26  | 119.58  |
| lower | 7280.748   | 91.54   | 90.58   | 90.76   |
| lower | 7255       | Culvert |         |         |
| lower | 7190.137   | 390.14  | 390.14  | 390.14  |
| lower | 6800       | 215.9   | 215.9   | 215.9   |
| lower | 6584.101   | 694     | 694     | 694     |
| lower | 5890       | 100     | 100     | 100     |
| lower | 5790       | 110     | 110     | 110     |
| lower | 5701       | Culvert |         |         |
| lower | 5680       | 120     | 120     | 120     |
| lower | 5560.176   | 1308.86 | 1305.57 | 1302.7  |
| lower | 4255.943   | 1414.64 | 1415.76 | 1416.72 |
| lower | 2839.724   | 1115.34 | 1115.82 | 1116.3  |
| lower | 1723.771   | 815.8   | 815.8   | 815.85  |

|       |          |        |        |       |
|-------|----------|--------|--------|-------|
| lower | 907.9108 | 867.85 | 868.75 | 869.7 |
| lower | 39.12192 | 43.37  | 41.89  | 37.51 |

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS  
River: Rancho

| Reach | River Sta. | Contr.  | Expan. |
|-------|------------|---------|--------|
| lower | 17703.33   | .1      | .3     |
| lower | 17497.06   | .1      | .3     |
| lower | 17173.04   | .1      | .3     |
| lower | 16542.69   | .1      | .3     |
| lower | 16236.51   | .1      | .3     |
| lower | 15706.68   | .1      | .3     |
| lower | 15499.54   | .1      | .3     |
| lower | 15031.36   | .1      | .3     |
| lower | 14411.04   | .1      | .3     |
| lower | 13841.4    | .1      | .3     |
| lower | 13754.98   | .1      | .3     |
| lower | 13533.66   | .1      | .3     |
| lower | 13400      | Culvert |        |
| lower | 13376.99   | .1      | .3     |
| lower | 13038.48   | .1      | .3     |
| lower | 12931.09   | .1      | .3     |
| lower | 12719.33   | .1      | .3     |
| lower | 12700      | Culvert |        |
| lower | 12609.91   | .1      | .3     |
| lower | 12394.78   | .1      | .3     |
| lower | 12380      | Culvert |        |
| lower | 12306.29   | .1      | .3     |
| lower | 12237.41   | .1      | .3     |
| lower | 12152.03   | .1      | .3     |
| lower | 12100      | Culvert |        |
| lower | 12055.63   | .1      | .3     |
| lower | 11687.51   | .1      | .3     |
| lower | 11615      | Culvert |        |
| lower | 11608.09   | .1      | .3     |
| lower | 11482.64   | .1      | .3     |
| lower | 11346.39   | .1      | .3     |
| lower | 11200      | .1      | .3     |
| lower | 10302.11   | .1      | .3     |
| lower | 9875.193   | .1      | .3     |
| lower | 9730.641   | .1      | .3     |
| lower | 9032.391   | .1      | .3     |
| lower | 8935.525   | .1      | .3     |
| lower | 8765.933   | .1      | .3     |
| lower | 7977.189   | .1      | .3     |
| lower | 7607.411   | .1      | .3     |
| lower | 7469.225   | .1      | .3     |
| lower | 7405       | Culvert |        |
| lower | 7400       | .1      | .3     |
| lower | 7280.748   | .1      | .3     |
| lower | 7255       | Culvert |        |
| lower | 7190.137   | .1      | .3     |
| lower | 6800       | .1      | .3     |
| lower | 6584.101   | .1      | .3     |
| lower | 5890       | .1      | .3     |
| lower | 5790       | .1      | .3     |
| lower | 5701       | Culvert |        |
| lower | 5680       | .1      | .3     |
| lower | 5560.176   | .1      | .3     |
| lower | 4255.943   | .1      | .3     |
| lower | 2839.724   | .1      | .3     |
| lower | 1723.771   | .1      | .3     |
| lower | 907.9108   | .1      | .3     |
| lower | 39.12192   | .1      | .3     |

HEC-RAS Plan: Plan 01 River: Rancho Reach: lower

| Reach | River Sta | Profile   | Q Total<br>(cfs) | Min Ch El<br>(ft) | W.S. Elev<br>(ft) | Crit W.S.<br>(ft) | E.G. Elev<br>(ft) | E.G. Slope<br>(ft/ft) | Vel Chnl<br>(ft/s) | Flow Area<br>(sq ft) | Top Width<br>(ft) | Froude # Chl |
|-------|-----------|-----------|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|----------------------|-------------------|--------------|
| lower | 17703.33  | Effective | 966.00           | 2252.85           | 2256.24           | 2255.08           | 2256.42           | 0.001488              | 3.44               | 280.95               | 379.06            | 0.39         |
| lower | 17703.33  | Proposed  | 761.00           | 2252.85           | 2255.20           | 2254.90           | 2255.54           | 0.005636              | 4.68               | 162.71               | 378.37            | 0.69         |
| lower | 17497.06  | Effective | 966.00           | 2252.91           | 2256.07           | 2254.67           | 2256.21           | 0.000694              | 2.76               | 324.07               | 760.83            | 0.28         |
| lower | 17497.06  | Proposed  | 360.00           | 2252.91           | 2255.02           | 2253.95           | 2255.07           | 0.000525              | 1.82               | 195.63               | 759.89            | 0.23         |
| lower | 17173.04  | Effective | 1207.00          | 2252.60           | 2255.83           | 2254.40           | 2255.92           | 0.000964              | 2.77               | 521.49               | 469.65            | 0.31         |
| lower | 17173.04  | Proposed  | 439.00           | 2252.60           | 2254.82           | 2253.84           | 2254.86           | 0.000751              | 1.71               | 289.35               | 402.99            | 0.25         |
| lower | 16542.69  | Effective | 2037.00          | 2252.54           | 2255.15           | 2253.97           | 2255.28           | 0.001051              | 2.49               | 719.90               | 1077.00           | 0.32         |
| lower | 16542.69  | Proposed  | 830.00           | 2252.54           | 2253.88           | 2253.32           | 2253.99           | 0.002061              | 1.70               | 320.90               | 906.14            | 0.37         |
| lower | 16236.51  | Effective | 2121.00          | 2250.55           | 2254.01           | 2253.67           | 2254.61           | 0.005081              | 6.34               | 348.85               | 1379.23           | 0.72         |
| lower | 16236.51  | Proposed  | 723.00           | 2250.55           | 2253.03           | 2252.31           | 2253.25           | 0.002904              | 3.76               | 193.16               | 775.94            | 0.51         |
| lower | 15706.68  | Effective | 2121.00          | 2249.56           | 2252.10           | 2251.56           | 2252.37           | 0.003310              | 4.26               | 531.91               | 1127.09           | 0.56         |
| lower | 15706.68  | Proposed  | 723.00           | 2249.56           | 2250.97           | 2250.69           | 2251.17           | 0.005540              | 3.65               | 198.27               | 798.15            | 0.65         |
| lower | 15499.54  | Effective | 2121.00          | 2247.74           | 2250.80           | 2250.65           | 2251.35           | 0.007450              | 6.09               | 367.89               | 649.14            | 0.82         |
| lower | 15499.54  | Proposed  | 723.00           | 2247.74           | 2249.65           | 2249.29           | 2249.98           | 0.005826              | 4.64               | 155.73               | 211.57            | 0.70         |
| lower | 15031.36  | Effective | 1270.00          | 2244.92           | 2246.94           | 2246.94           | 2247.53           | 0.009602              | 5.68               | 226.93               | 824.24            | 0.89         |
| lower | 15031.36  | Proposed  | 463.00           | 2244.92           | 2246.30           | 2246.30           | 2246.63           | 0.010370              | 4.79               | 109.63               | 792.18            | 0.88         |
| lower | 14411.04  | Effective | 1499.00          | 2234.56           | 2235.90           | 2236.51           | 2238.20           | 0.023239              | 5.27               | 173.30               | 413.59            | 1.22         |
| lower | 14411.04  | Proposed  | 533.00           | 2234.56           | 2235.37           | 2235.85           | 2237.04           | 0.022924              | 3.16               | 68.01                | 177.67            | 1.06         |
| lower | 13841.4   | Effective | 1499.00          | 2227.56           | 2230.81           | 2230.92           | 2231.36           | 0.006451              | 3.67               | 358.69               | 876.81            | 0.69         |
| lower | 13841.4   | Proposed  | 533.00           | 2227.56           | 2229.87           | 2229.87           | 2230.32           | 0.012495              | 4.94               | 100.46               | 510.43            | 0.95         |
| lower | 13754.98  | Effective | 1499.00          | 2223.34           | 2227.25           | 2228.52           | 2230.10           | 0.028935              | 13.56              | 110.58               | 356.29            | 1.66         |
| lower | 13754.98  | Proposed  | 533.00           | 2223.34           | 2226.44           | 2226.44           | 2227.29           | 0.011076              | 7.40               | 71.99                | 343.33            | 1.00         |
| lower | 13533.66  | Effective | 1499.00          | 2221.12           | 2226.01           | 2226.22           | 2226.87           | 0.006444              | 7.99               | 244.66               | 328.08            | 0.79         |
| lower | 13533.66  | Proposed  | 533.00           | 2221.12           | 2225.61           | 2223.49           | 2225.82           | 0.001706              | 3.75               | 164.55               | 277.20            | 0.40         |
| lower | 13400     |           | Culvert          |                   |                   |                   |                   |                       |                    |                      |                   |              |
| lower | 13376.99  | Effective | 1499.00          | 2218.32           | 2221.71           | 2221.71           | 2222.29           | 0.010979              | 8.50               | 294.69               | 343.07            | 1.01         |
| lower | 13376.99  | Proposed  | 533.00           | 2218.32           | 2220.90           | 2220.90           | 2221.31           | 0.008999              | 6.49               | 129.18               | 238.25            | 0.88         |
| lower | 13038.48  | Effective | 1499.00          | 2215.20           | 2219.11           | 2217.65           | 2219.23           | 0.000880              | 2.77               | 542.32               | 407.69            | 0.30         |
| lower | 13038.48  | Proposed  | 533.00           | 2215.20           | 2217.40           | 2216.96           | 2217.52           | 0.003292              | 2.78               | 191.77               | 387.78            | 0.50         |
| lower | 12931.09  | Effective | 1499.00          | 2214.47           | 2219.07           | 2217.09           | 2219.15           | 0.000488              | 2.33               | 644.64               | 490.73            | 0.23         |
| lower | 12931.09  | Proposed  | 533.00           | 2214.47           | 2217.26           | 2216.45           | 2217.32           | 0.001015              | 1.94               | 275.42               | 456.22            | 0.29         |
| lower | 12719.33  | Effective | 1286.00          | 2212.96           | 2218.97           | 2216.66           | 2219.05           | 0.000488              | 3.01               | 618.77               | 837.88            | 0.23         |
| lower | 12719.33  | Proposed  | 495.00           | 2212.96           | 2217.08           | 2215.62           | 2217.15           | 0.000633              | 2.67               | 275.58               | 476.14            | 0.25         |
| lower | 12700     |           | Culvert          |                   |                   |                   |                   |                       |                    |                      |                   |              |
| lower | 12609.91  | Effective | 1286.00          | 2212.90           | 2218.38           | 2218.38           | 2219.02           | 0.003699              | 7.21               | 246.44               | 769.40            | 0.57         |
| lower | 12609.91  | Proposed  | 495.00           | 2212.90           | 2216.46           | 2215.52           | 2217.14           | 0.004670              | 6.58               | 75.25                | 345.96            | 0.62         |
| lower | 12394.78  | Effective | 1286.00          | 2211.85           | 2217.55           | 2216.89           | 2217.96           | 0.002984              | 4.63               | 256.03               | 500.99            | 0.52         |
| lower | 12394.78  | Proposed  | 495.00           | 2211.85           | 2215.32           | 2214.57           | 2216.06           | 0.005276              | 6.92               | 71.55                | 291.65            | 0.68         |
| lower | 12380     |           | Culvert          |                   |                   |                   |                   |                       |                    |                      |                   |              |
| lower | 12306.29  | Effective | 1286.00          | 2211.78           | 2216.51           | 2216.51           | 2217.23           | 0.004093              | 7.42               | 212.32               | 334.49            | 0.65         |
| lower | 12306.29  | Proposed  | 495.00           | 2211.78           | 2214.16           | 2214.16           | 2215.21           | 0.011111              | 8.20               | 60.35                | 121.01            | 0.99         |
| lower | 12237.41  | Effective | 1286.00          | 2211.64           | 2213.66           | 2214.46           | 2216.39           | 0.038309              | 13.24              | 97.13                | 319.49            | 1.82         |
| lower | 12237.41  | Proposed  | 495.00           | 2211.64           | 2213.05           | 2213.32           | 2214.07           | 0.026048              | 8.14               | 60.84                | 314.34            | 1.40         |
| lower | 12152.03  | Effective | 1286.00          | 2209.00           | 2215.41           | 2212.63           | 2215.67           | 0.000899              | 4.31               | 347.93               | 318.48            | 0.33         |
| lower | 12152.03  | Proposed  | 495.00           | 2209.00           | 2213.03           | 2211.13           | 2213.19           | 0.000963              | 3.28               | 151.10               | 191.82            | 0.32         |
| lower | 12100     |           | Culvert          |                   |                   |                   |                   |                       |                    |                      |                   |              |
| lower | 12055.63  | Effective | 1286.00          | 2208.80           | 2214.13           | 2212.33           | 2214.56           | 0.001706              | 5.28               | 252.65               | 257.57            | 0.45         |
| lower | 12055.63  | Proposed  | 495.00           | 2208.80           | 2212.80           | 2211.05           | 2212.94           | 0.000839              | 2.95               | 167.89               | 196.08            | 0.30         |
| lower | 11687.51  | Effective | 1286.00          | 2209.38           | 2212.95           | 2212.95           | 2213.59           | 0.004292              | 6.91               | 226.25               | 383.86            | 0.67         |

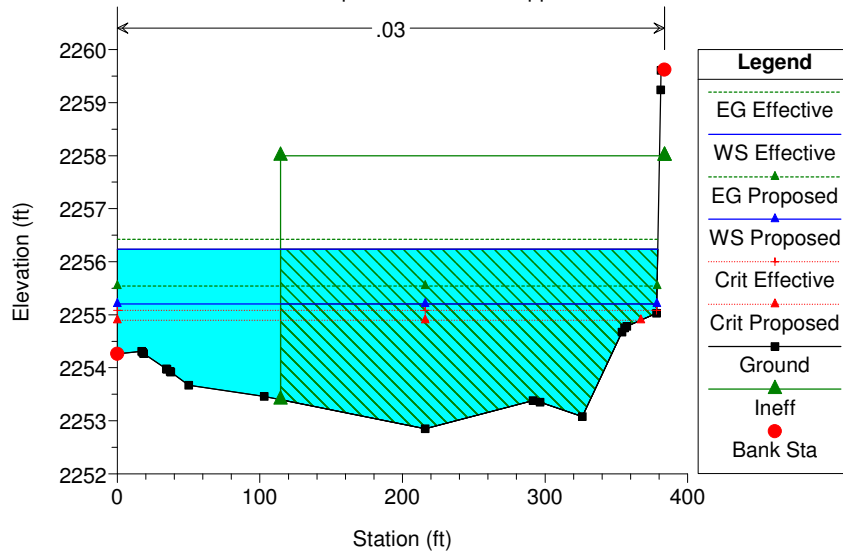
HEC-RAS Plan: Plan 01 River: Rancho Reach: lower (Continued)

| Reach | River Sta | Profile   | Q Total<br>(cfs) | Min Ch El<br>(ft) | W.S. Elev<br>(ft) | Crit W.S.<br>(ft) | E.G. Elev<br>(ft) | E.G. Slope<br>(ft/ft) | Vel Chnl<br>(ft/s) | Flow Area<br>(sq ft) | Top Width<br>(ft) | Froude # Chl |
|-------|-----------|-----------|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|----------------------|-------------------|--------------|
| lower | 11687.51  | Proposed  | 495.00           | 2209.38           | 2212.21           | 2211.08           | 2212.47           | 0.002011              | 4.07               | 127.20               | 274.90            | 0.44         |
| lower | 11615     | Culvert   |                  |                   |                   |                   |                   |                       |                    |                      |                   |              |
| lower | 11608.09  | Effective | 1441.00          | 2209.13           | 2212.63           | 2212.63           | 2213.07           | 0.003566              | 6.15               | 343.31               | 608.83            | 0.62         |
| lower | 11608.09  | Proposed  | 742.00           | 2209.13           | 2211.76           | 2211.76           | 2212.40           | 0.006347              | 6.56               | 126.35               | 344.12            | 0.78         |
| lower | 11482.64  | Effective | 1441.00          | 2207.34           | 2211.77           | 2211.65           | 2212.43           | 0.004208              | 6.98               | 272.64               | 552.63            | 0.68         |
| lower | 11482.64  | Proposed  | 742.00           | 2207.34           | 2211.40           | 2210.02           | 2211.68           | 0.001914              | 4.35               | 202.59               | 460.80            | 0.45         |
| lower | 11346.39  | Effective | 1441.00          | 2204.60           | 2210.98           | 2210.98           | 2211.62           | 0.008873              | 6.63               | 229.98               | 264.22            | 0.85         |
| lower | 11346.39  | Proposed  | 742.00           | 2204.60           | 2208.84           | 2208.84           | 2210.94           | 0.014566              | 11.63              | 63.79                | 15.08             | 1.00         |
| lower | 11200     | Effective | 1418.00          | 2204.91           | 2210.28           | 2210.06           | 2210.66           | 0.002352              | 5.91               | 320.49               | 303.54            | 0.49         |
| lower | 11200     | Proposed  | 1.00             | 2204.91           | 2205.29           | 2205.09           | 2205.29           | 0.000481              | 0.36               | 2.82                 | 14.90             | 0.14         |
| lower | 10302.11  | Effective | 1418.00          | 2203.87           | 2207.04           | 2207.04           | 2207.58           | 0.005421              | 5.92               | 284.67               | 540.98            | 0.72         |
| lower | 10302.11  | Proposed  | 1.00             | 2203.87           | 2204.25           | 2204.15           | 2204.27           | 0.005210              | 1.17               | 0.86                 | 139.14            | 0.47         |
| lower | 9875.193  | Effective | 1418.00          | 2201.63           | 2202.53           | 2202.81           | 2203.45           | 0.021433              | 6.10               | 193.28               | 418.89            | 1.22         |
| lower | 9875.193  | Proposed  | 1.00             | 2201.63           | 2201.48           | 2201.47           | 2201.50           | 0.008280              |                    | 1.16                 | 74.24             | 0.00         |
| lower | 9730.641  | Effective | 1418.00          | 2200.13           | 2201.70           | 2201.70           | 2202.20           | 0.010336              | 5.77               | 252.08               | 446.26            | 0.92         |
| lower | 9730.641  | Proposed  | 1.00             | 2200.13           | 2200.23           | 2200.20           | 2200.24           | 0.008903              | 0.70               | 1.43                 | 65.85             | 0.51         |
| lower | 9032.391  | Effective | 1418.00          | 2195.93           | 2198.15           | 2197.67           | 2198.38           | 0.001975              | 3.13               | 500.11               | 640.67            | 0.42         |
| lower | 9032.391  | Proposed  | 1.00             | 2195.93           | 2195.91           | 2195.88           | 2195.92           | 0.004521              |                    | 1.08                 | 205.45            | 0.00         |
| lower | 8935.525  | Effective | 1418.00          | 2194.85           | 2197.15           | 2197.15           | 2197.99           | 0.006921              | 5.68               | 204.71               | 354.72            | 0.79         |
| lower | 8935.525  | Proposed  | 1.00             | 2194.85           | 2194.99           | 2194.99           | 2195.03           | 0.028695              | 1.54               | 0.65                 | 180.98            | 0.97         |
| lower | 8765.933  | Effective | 1418.00          | 2193.03           | 2195.54           | 2195.54           | 2196.26           | 0.007118              | 5.82               | 230.58               | 413.61            | 0.80         |
| lower | 8765.933  | Proposed  | 63.00            | 2193.03           | 2194.08           | 2193.80           | 2194.12           | 0.002182              | 1.56               | 39.86                | 265.70            | 0.37         |
| lower | 7977.189  | Effective | 1150.00          | 2188.38           | 2191.07           | 2190.98           | 2191.39           | 0.004593              | 4.88               | 254.76               | 414.67            | 0.64         |
| lower | 7977.189  | Proposed  | 150.00           | 2188.38           | 2190.10           | 2190.10           | 2190.38           | 0.007309              | 4.52               | 37.69                | 211.76            | 0.75         |
| lower | 7607.411  | Effective | 1097.00          | 2183.56           | 2187.86           | 2187.86           | 2189.05           | 0.008677              | 8.76               | 126.62               | 141.42            | 0.95         |
| lower | 7607.411  | Proposed  | 1.00             | 2183.56           | 2183.65           | 2183.78           | 2185.65           | 3.275700              | 11.36              | 0.09                 | 1.94              | 9.39         |
| lower | 7469.225  | Effective | 1097.00          | 2181.60           | 2187.19           | 2184.88           | 2187.56           | 0.001486              | 4.95               | 228.07               | 148.42            | 0.42         |
| lower | 7469.225  | Proposed  | 1.00             | 2181.60           | 2181.75           | 2181.64           | 2181.76           | 0.000329              | 0.25               | 4.00                 | 27.24             | 0.11         |
| lower | 7405      | Culvert   |                  |                   |                   |                   |                   |                       |                    |                      |                   |              |
| lower | 7400      | Effective | 1097.00          | 2180.49           | 2184.77           | 2183.81           | 2185.53           | 0.003961              | 7.00               | 156.72               | 83.09             | 0.65         |
| lower | 7400      | Proposed  | 1.00             | 2180.49           | 2180.53           | 2180.53           | 2180.54           | 0.033006              | 0.97               | 1.03                 | 29.23             | 0.91         |
| lower | 7280.748  | Effective | 1097.00          | 2179.13           | 2184.82           | 2182.41           | 2185.16           | 0.001283              | 4.70               | 244.13               | 136.98            | 0.39         |
| lower | 7280.748  | Proposed  | 1.00             | 2179.13           | 2179.64           | 2179.28           | 2179.64           | 0.000041              | 0.13               | 7.74                 | 29.89             | 0.04         |
| lower | 7255      | Culvert   |                  |                   |                   |                   |                   |                       |                    |                      |                   |              |
| lower | 7190.137  | Effective | 478.00           | 2178.06           | 2181.49           | 2180.46           | 2181.80           | 0.002569              | 4.52               | 105.80               | 42.75             | 0.51         |
| lower | 7190.137  | Proposed  | 1.00             | 2178.06           | 2179.64           | 2178.20           | 2179.64           | 0.000000              | 0.03               | 35.27                | 33.40             | 0.00         |
| lower | 6800      | Effective | 478.00           | 2178.27           | 2179.95           | 2179.95           | 2180.38           | 0.005551              | 3.11               | 103.02               | 270.29            | 0.62         |
| lower | 6800      | Proposed  | 81.00            | 2178.27           | 2179.05           | 2179.05           | 2179.24           | 0.009752              | 2.81               | 23.73                | 204.18            | 0.75         |
| lower | 6584.101  | Effective | 278.00           | 2173.84           | 2175.08           | 2175.08           | 2175.49           | 0.009484              | 3.66               | 57.27                | 242.08            | 0.79         |
| lower | 6584.101  | Proposed  | 1.00             | 2173.84           | 2173.97           | 2173.97           | 2174.00           | 0.020564              | 1.09               | 0.73                 | 119.37            | 0.78         |
| lower | 5890      | Effective | 278.00           | 2163.26           | 2166.85           | 2166.91           | 2167.85           | 0.012726              | 8.02               | 34.64                | 105.99            | 1.04         |
| lower | 5890      | Proposed  | 1.00             | 2163.26           | 2164.51           | 2163.64           | 2164.51           | 0.000046              | 0.24               | 4.25                 | 92.35             | 0.05         |
| lower | 5790      | Effective | 278.00           | 2162.42           | 2165.90           | 2163.95           | 2166.02           | 0.000773              | 2.76               | 100.81               | 120.09            | 0.28         |
| lower | 5790      | Proposed  | 1.00             | 2162.42           | 2164.51           | 2162.45           | 2164.51           | 0.000000              | 0.02               | 57.23                | 115.90            | 0.00         |
| lower | 5701      | Culvert   |                  |                   |                   |                   |                   |                       |                    |                      |                   |              |
| lower | 5680      | Effective | 278.00           | 2161.92           | 2164.43           | 2163.45           | 2164.67           | 0.002336              | 3.98               | 69.89                | 117.17            | 0.46         |
| lower | 5680      | Proposed  | 1.00             | 2161.92           | 2164.51           | 2161.96           | 2164.51           | 0.000000              | 0.01               | 72.41                | 117.42            | 0.00         |
| lower | 5560.176  | Effective | 125.00           | 2160.92           | 2163.71           | 2163.57           | 2164.25           | 0.009556              | 5.88               | 21.25                | 101.48            | 0.87         |
| lower | 5560.176  | Proposed  | 141.00           | 2160.92           | 2163.72           | 2163.69           | 2164.40           | 0.011998              | 6.60               | 21.36                | 101.52            | 0.97         |

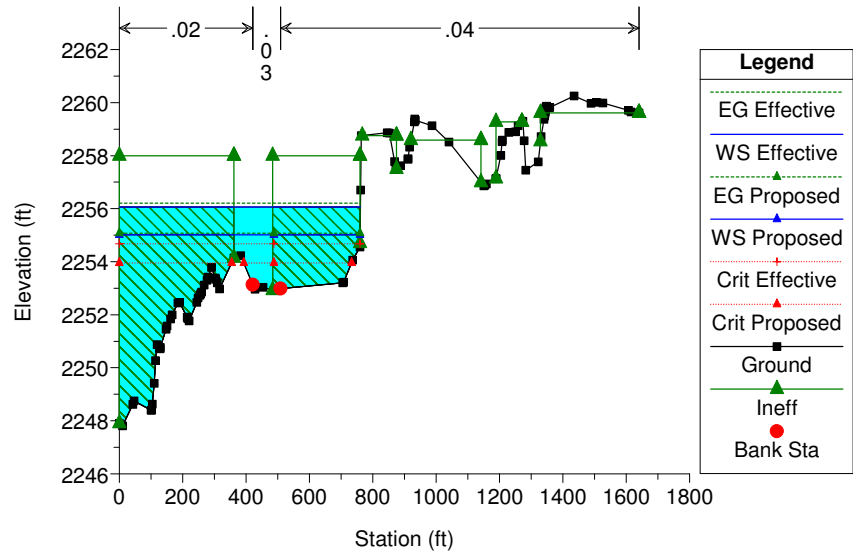
HEC-RAS Plan: Plan 01 River: Rancho Reach: lower (Continued)

| Reach | River Sta | Profile   | Q Total<br>(cfs) | Min Ch El<br>(ft) | W.S. Elev<br>(ft) | Crit W.S.<br>(ft) | E.G. Elev<br>(ft) | E.G. Slope<br>(ft/ft) | Vel Chnl<br>(ft/s) | Flow Area<br>(sq ft) | Top Width<br>(ft) | Froude # Chl |
|-------|-----------|-----------|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|----------------------|-------------------|--------------|
| lower | 4255.943  | Effective | 123.00           | 2147.30           | 2148.18           | 2148.18           | 2148.44           | 0.015748              | 4.05               | 30.37                | 173.70            | 0.98         |
| lower | 4255.943  | Proposed  | 138.00           | 2147.30           | 2148.29           | 2148.23           | 2148.51           | 0.012121              | 3.73               | 37.04                | 182.30            | 0.87         |
| lower | 2839.724  | Effective | 123.00           | 2131.06           | 2131.68           | 2131.58           | 2131.77           | 0.007679              | 2.47               | 50.16                | 375.87            | 0.66         |
| lower | 2839.724  | Proposed  | 138.00           | 2131.06           | 2131.65           | 2131.61           | 2131.79           | 0.011482              | 2.92               | 47.59                | 373.72            | 0.81         |
| lower | 1723.771  | Effective | 322.00           | 2118.38           | 2119.97           | 2119.88           | 2120.15           | 0.011856              | 3.66               | 98.14                | 580.83            | 0.86         |
| lower | 1723.771  | Proposed  | 364.00           | 2118.38           | 2120.05           | 2119.93           | 2120.22           | 0.009974              | 3.61               | 111.86               | 590.10            | 0.81         |
| lower | 907.9108  | Effective | 301.00           | 2112.54           | 2112.82           | 2112.55           | 2112.90           | 0.006752              |                    | 135.82               | 561.75            | 0.00         |
| lower | 907.9108  | Proposed  | 15.00            | 2112.54           | 2112.09           | 2112.01           | 2112.11           | 0.008325              |                    | 14.82                | 340.49            | 0.00         |
| lower | 39.12192  | Effective | 301.00           | 2107.45           | 2109.02           | 2108.60           | 2109.14           | 0.003003              | 2.86               | 106.23               | 756.11            | 0.48         |
| lower | 39.12192  | Proposed  | 15.00            | 2107.45           | 2108.02           | 2107.87           | 2108.04           | 0.003005              | 1.03               | 14.67                | 205.09            | 0.38         |

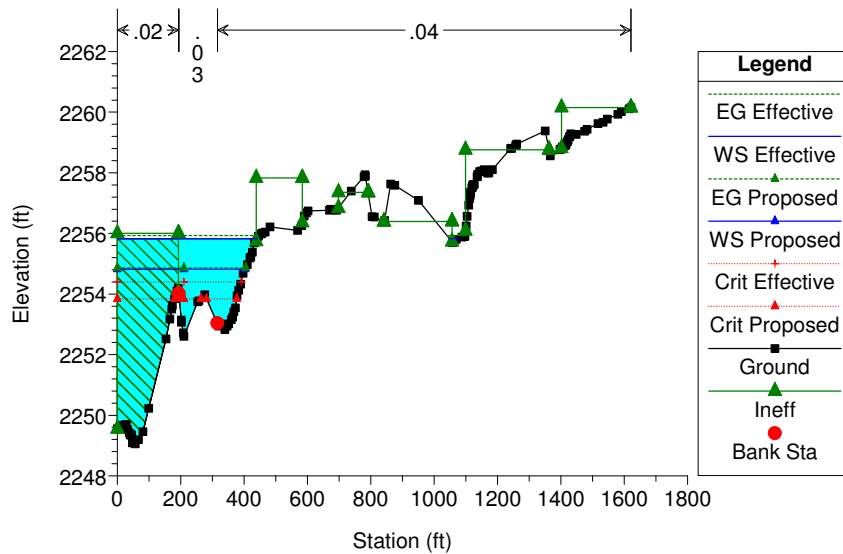
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018  
RS = 17703.33 Equals Sta. 0+00 in Upper Rancho Model



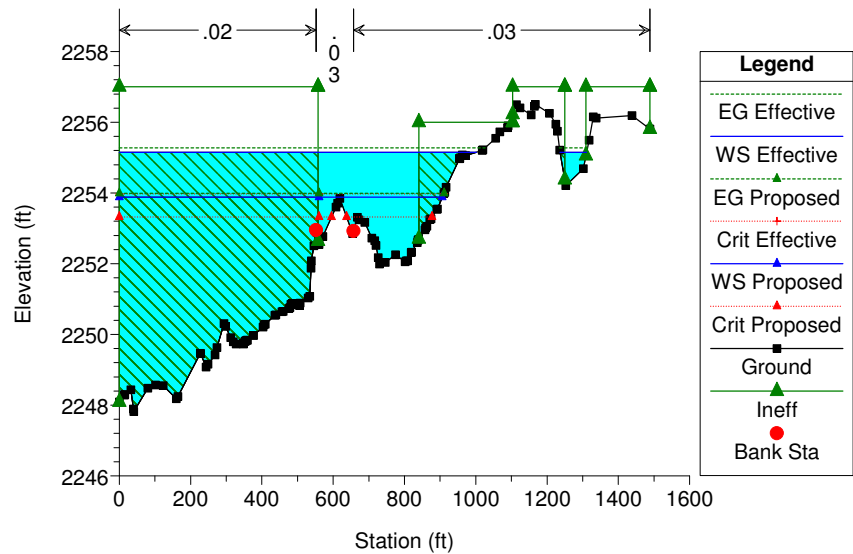
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018  
RS = 17497.06



LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018  
RS = 17173.04



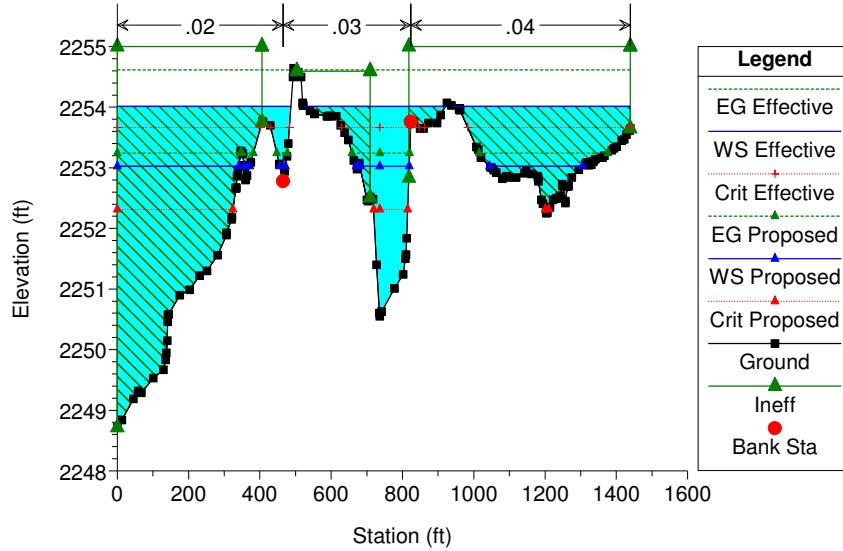
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018  
RS = 16542.69





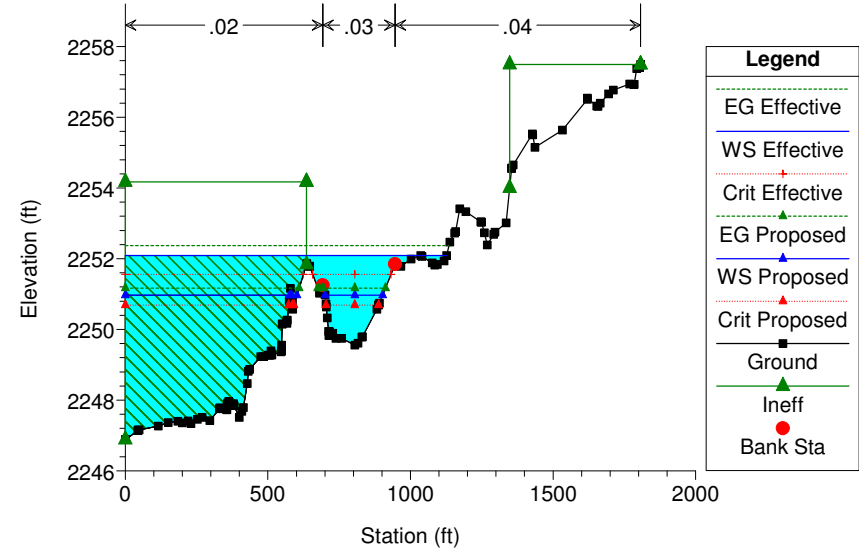
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

RS = 16236.51



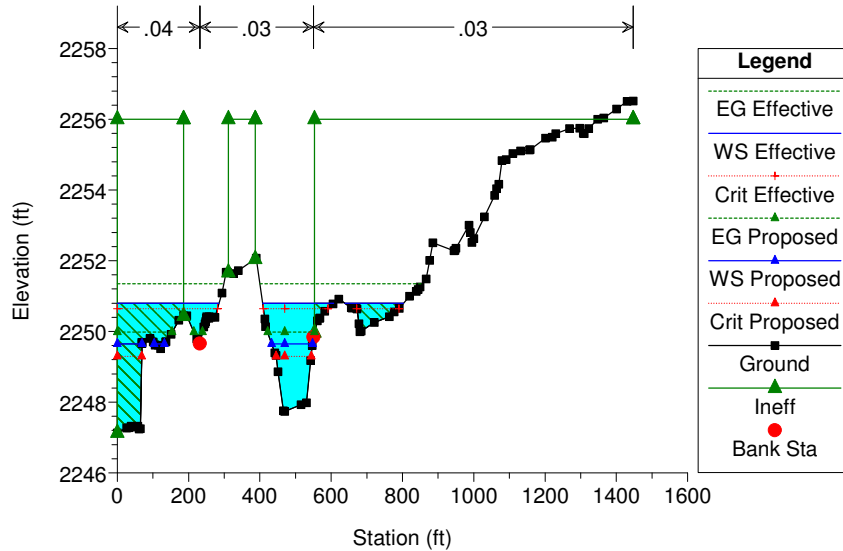
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

RS = 15706.68 Left bank is west side of Rancho.



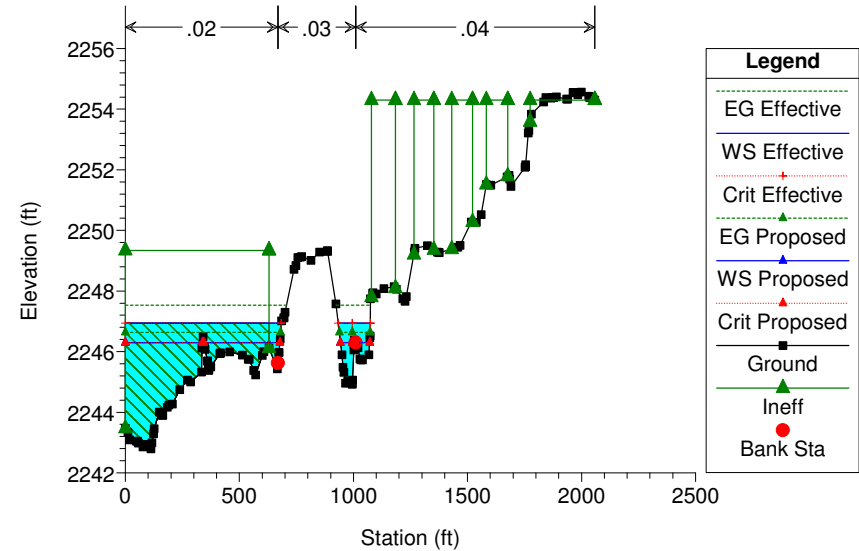
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

RS = 15499.54 Left bank is west curb of Rancho. Only west lane are effective



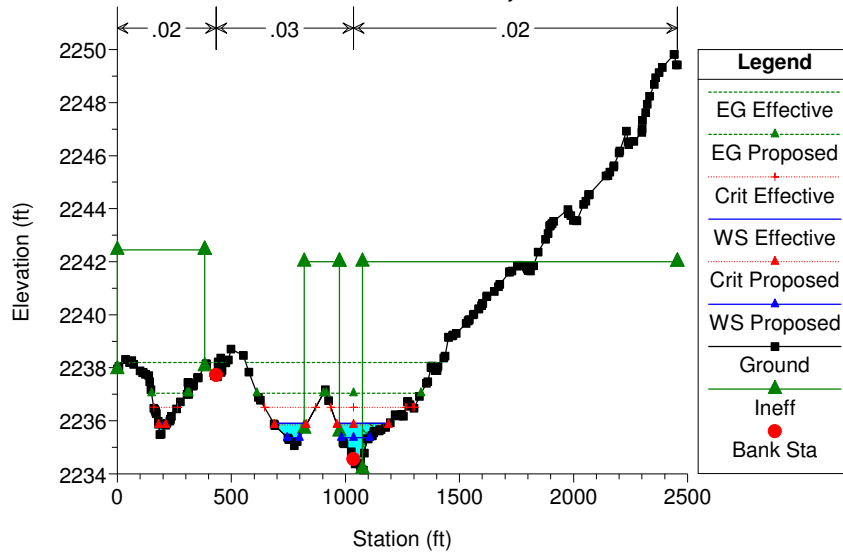
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

RS = 15031.36 Left bank is west curb of Rancho Right bank is west of Sterling ch



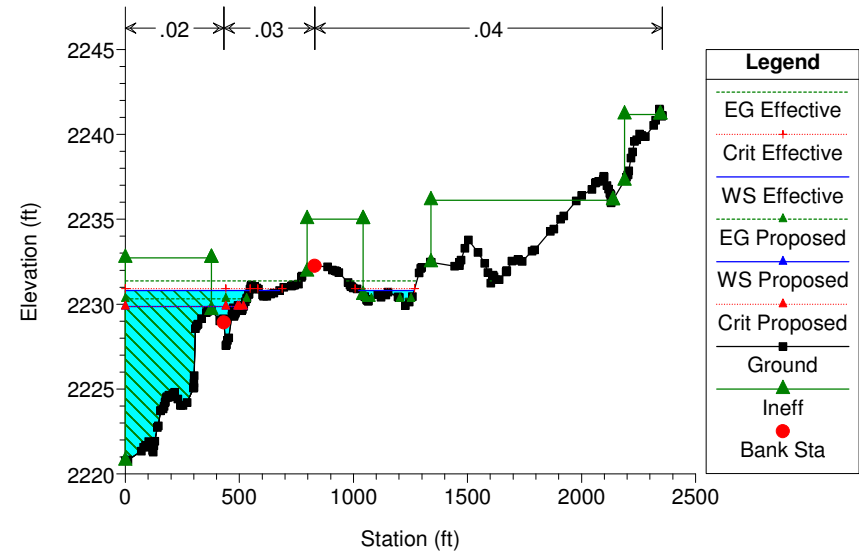
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

RS = 14411.04 Cheyenne



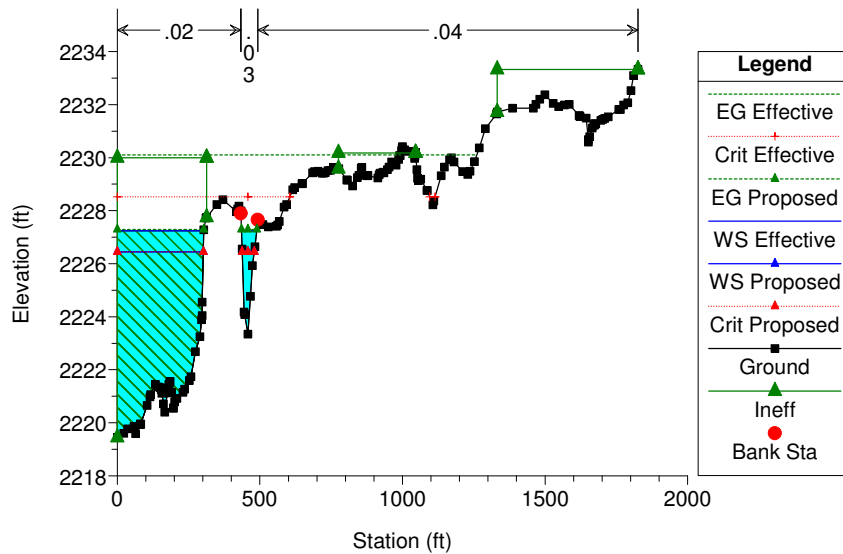
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

RS = 13841.4



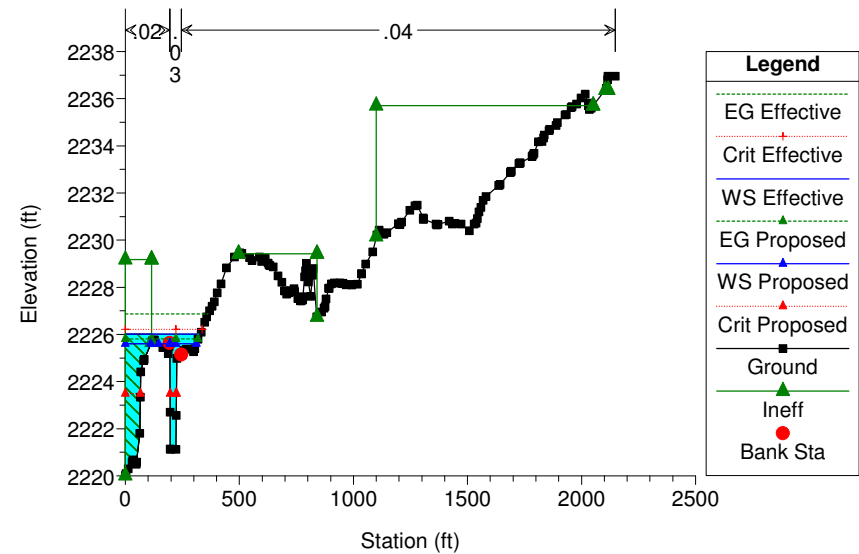
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

RS = 13754.98

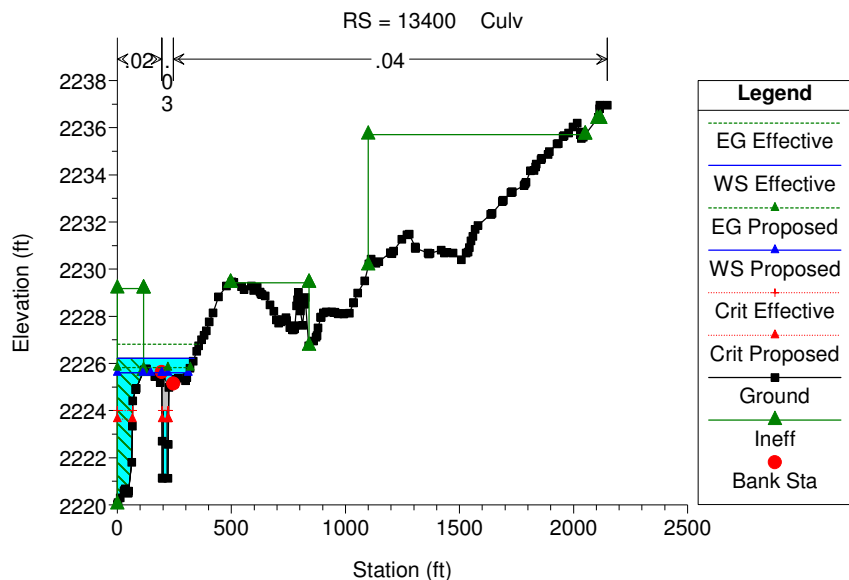


LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

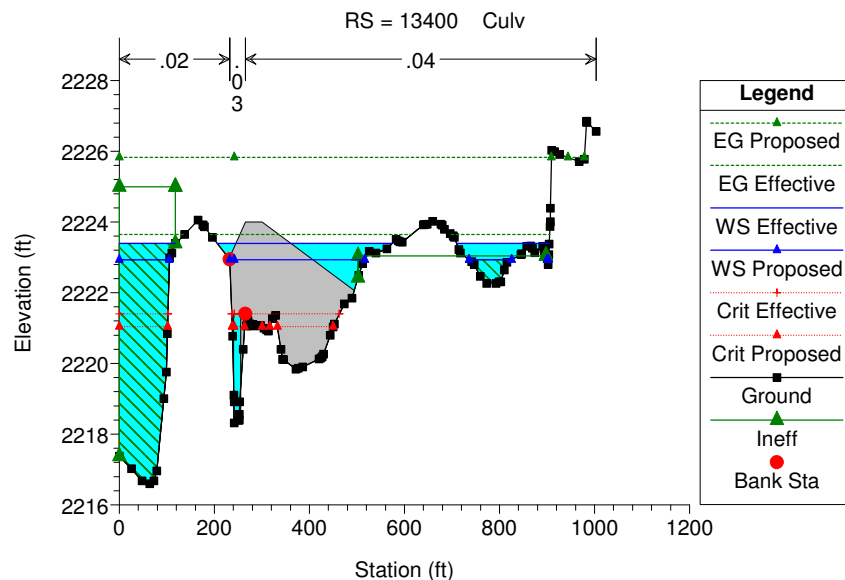
RS = 13533.66



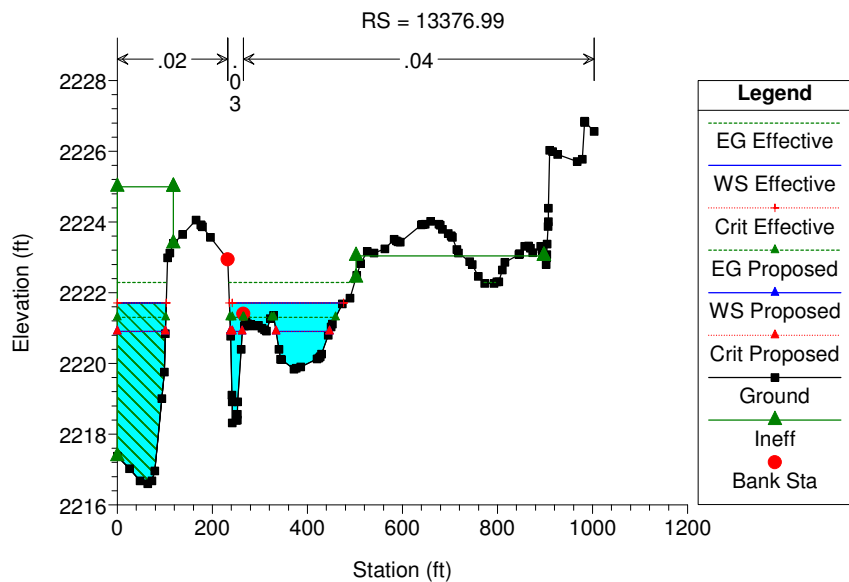
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018



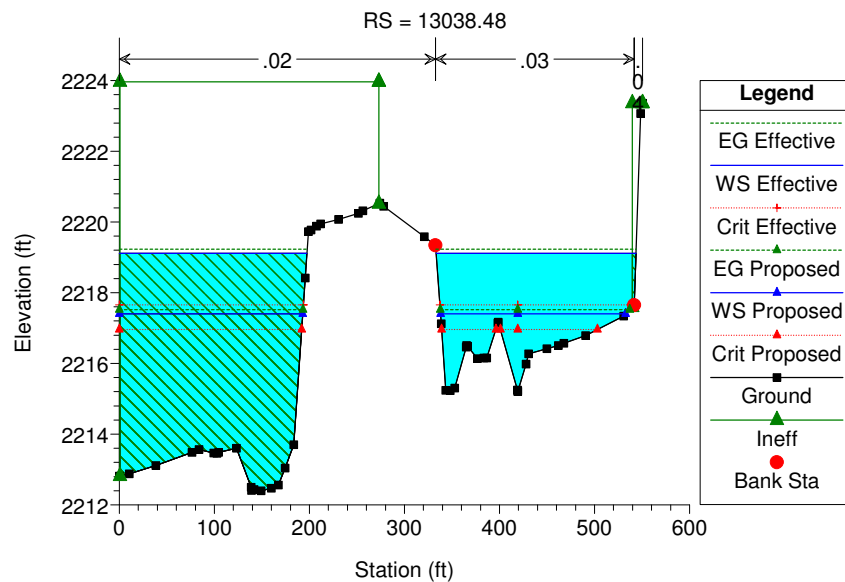
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018



LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

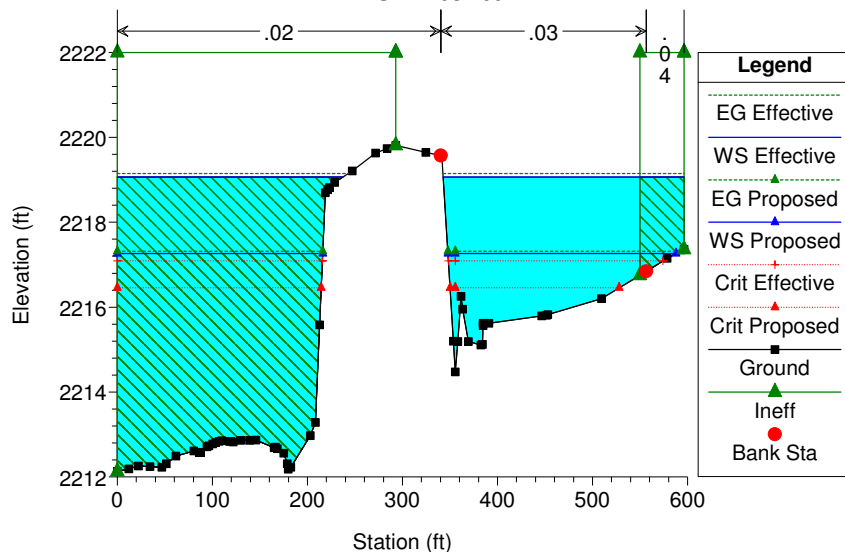


LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018



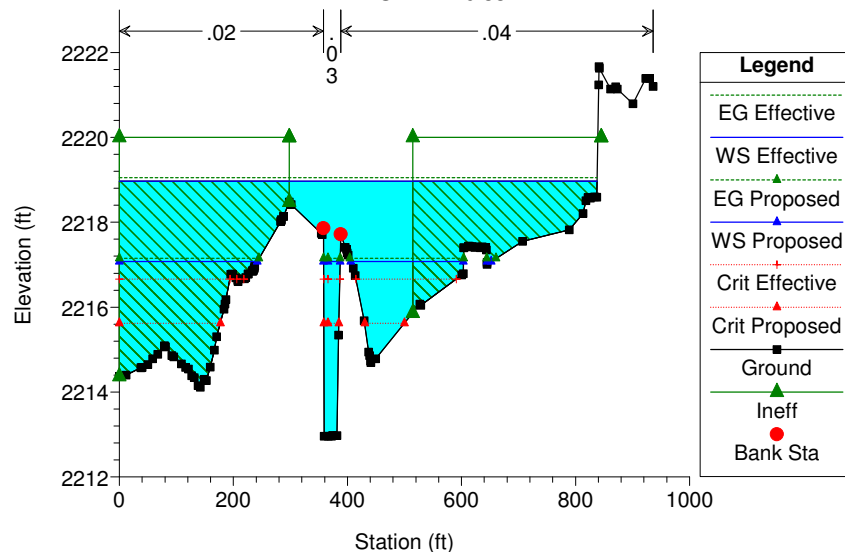
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

RS = 12931.09



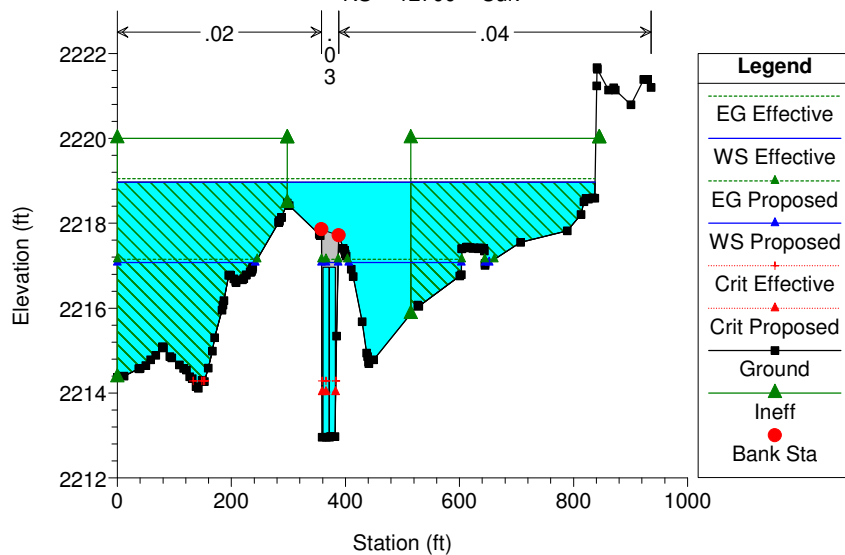
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

RS = 12719.33



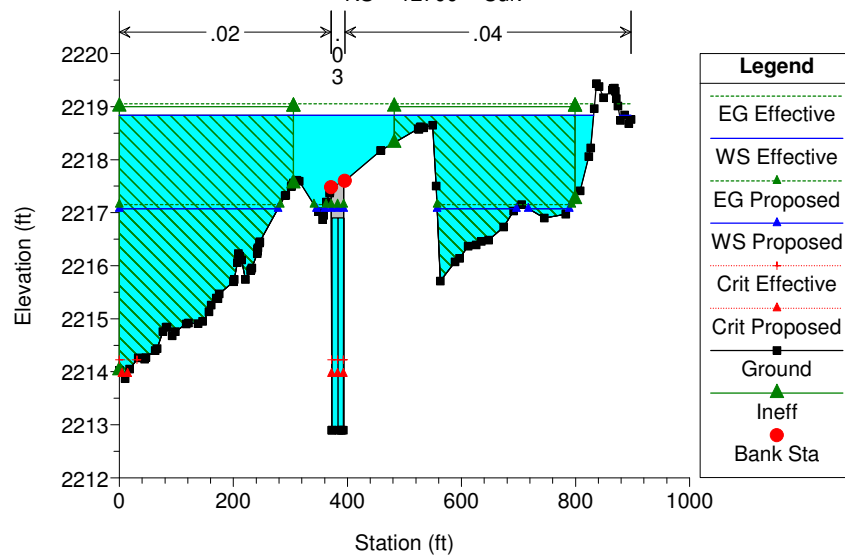
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

RS = 12700 Culv



LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

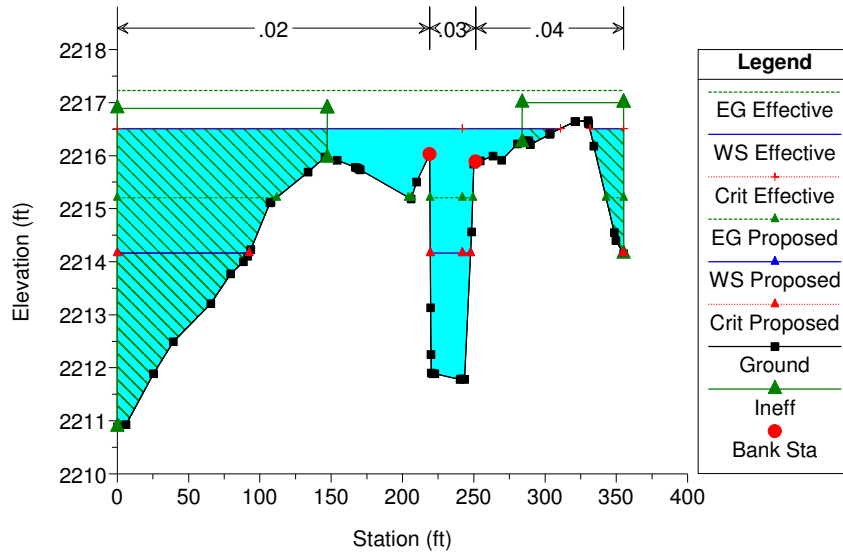
RS = 12700 Culv





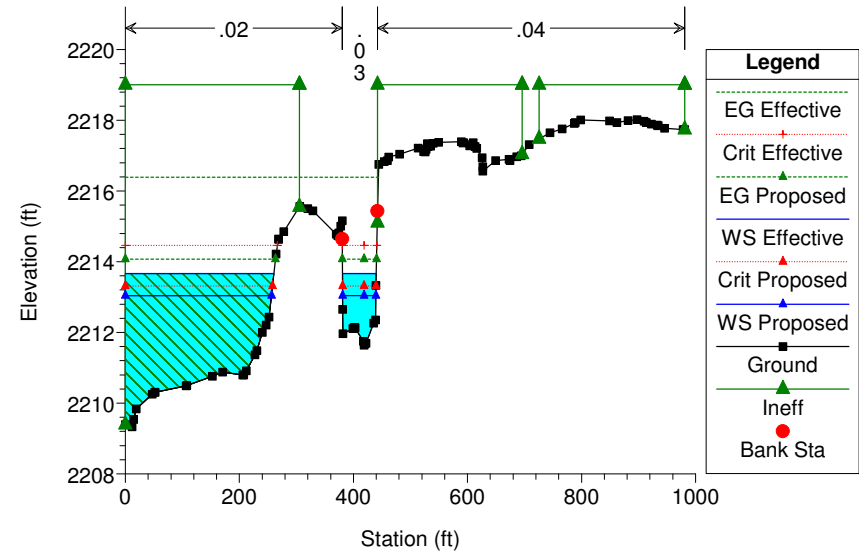
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

RS = 12306.29



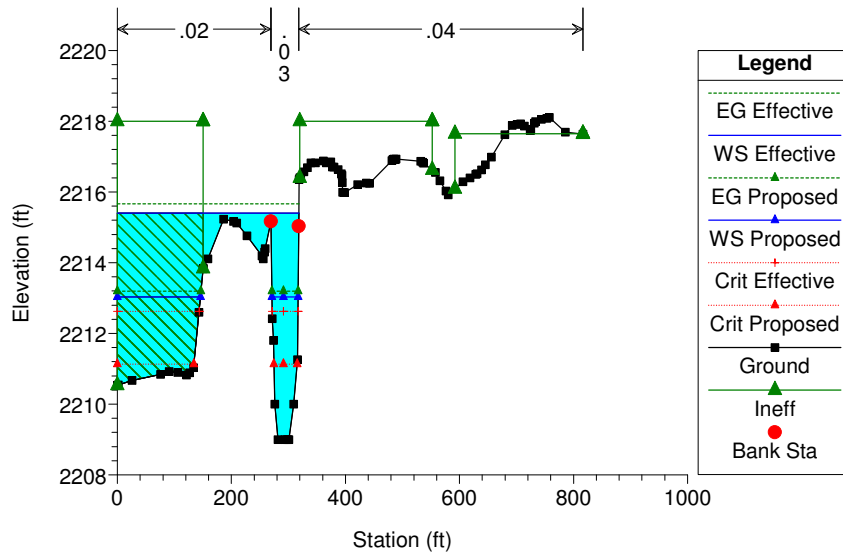
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

RS = 12237.41



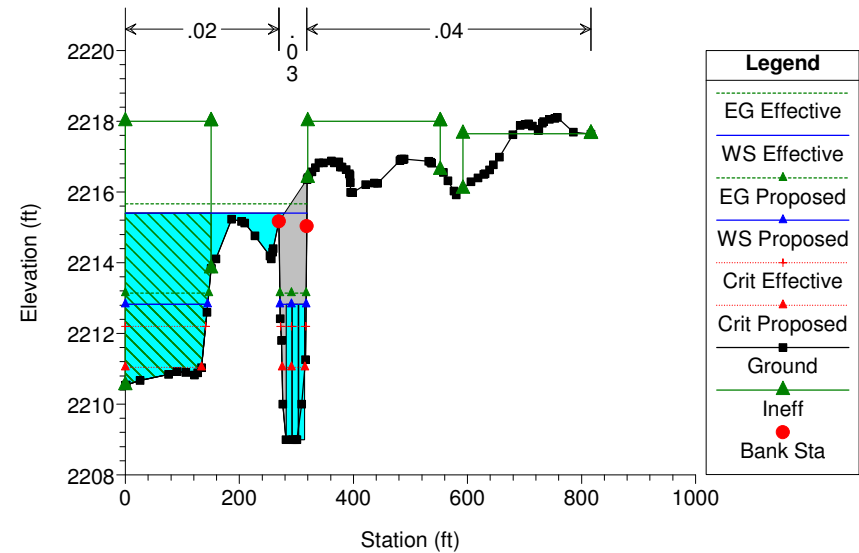
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

RS = 12152.03

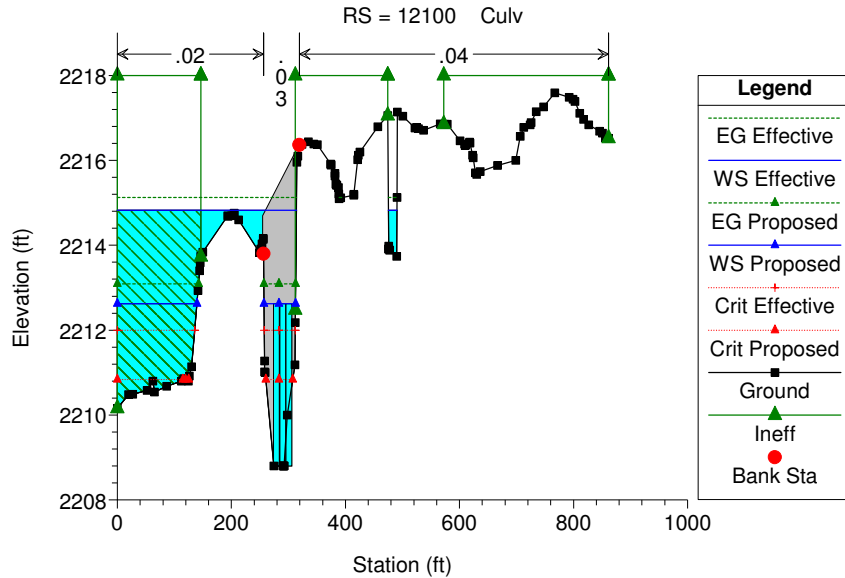


LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

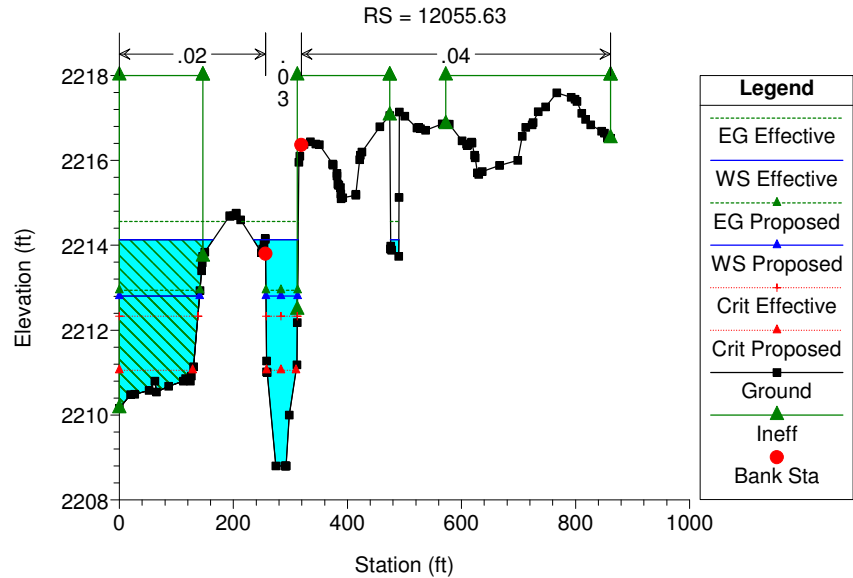
RS = 12100 Culv



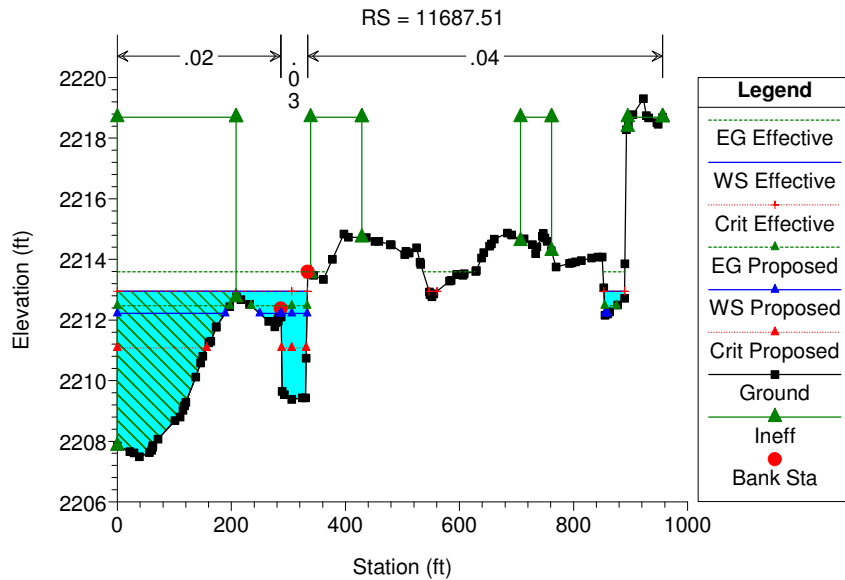
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018



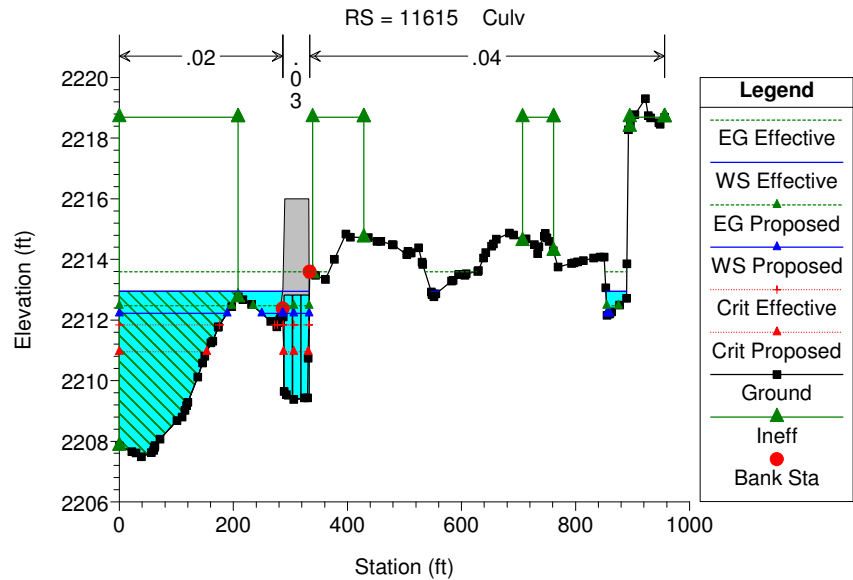
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018



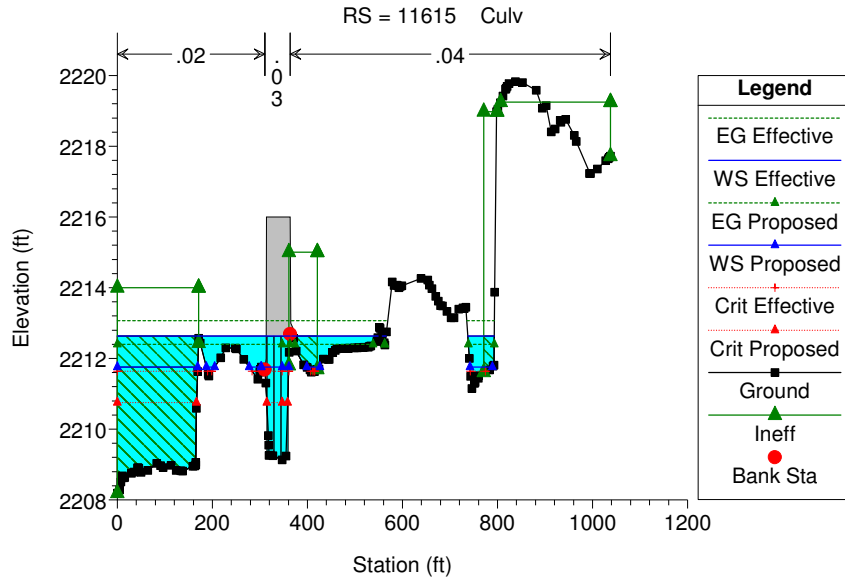
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018



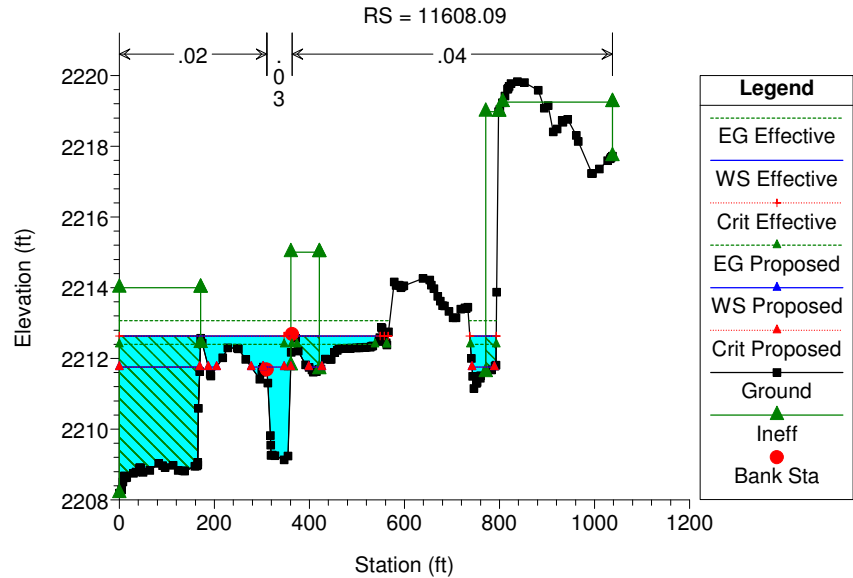
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018



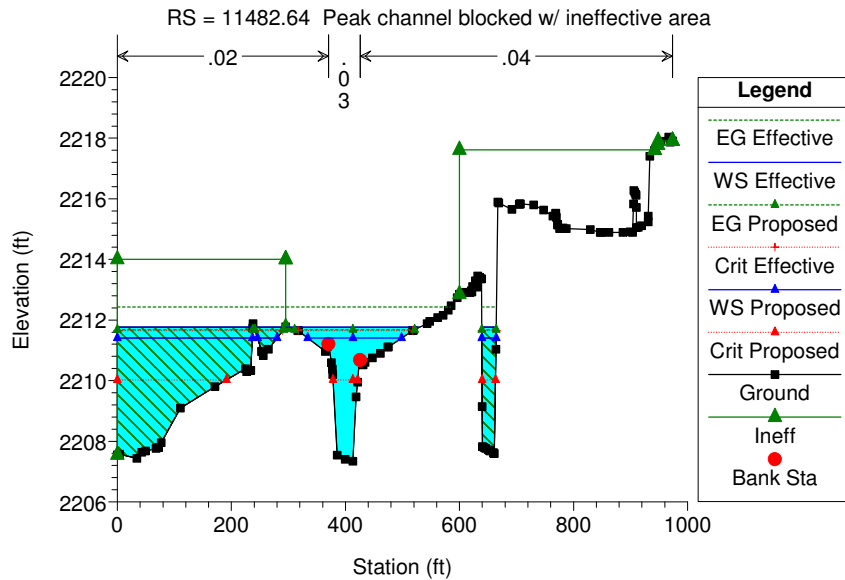
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018



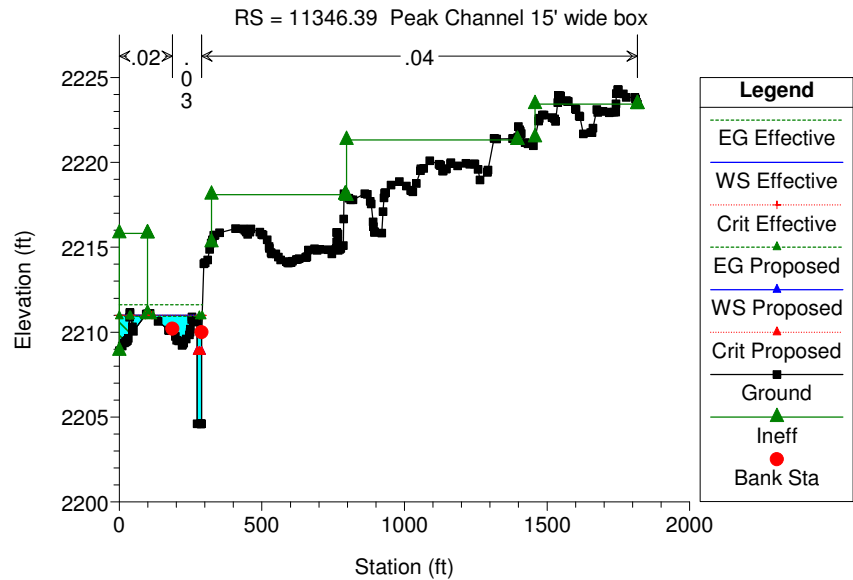
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018



LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018



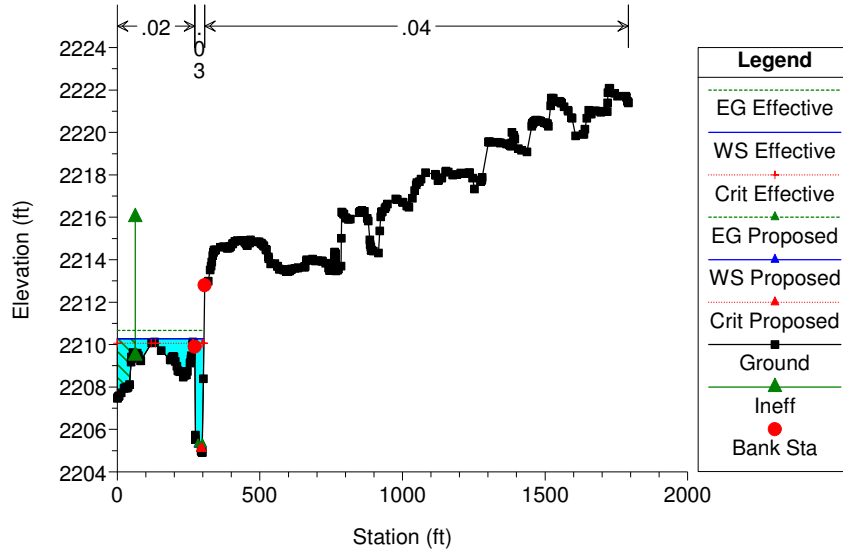
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018





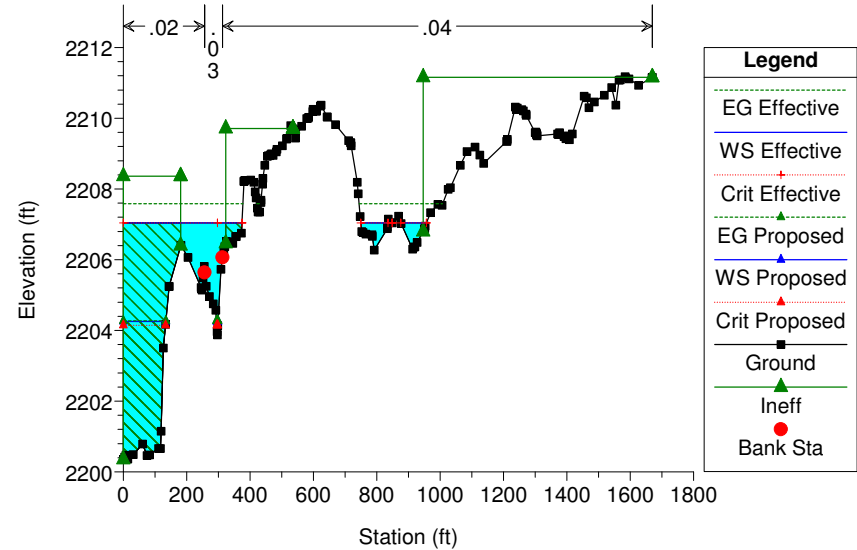
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

RS = 11200 Just north of Decatur, S of Peak SD



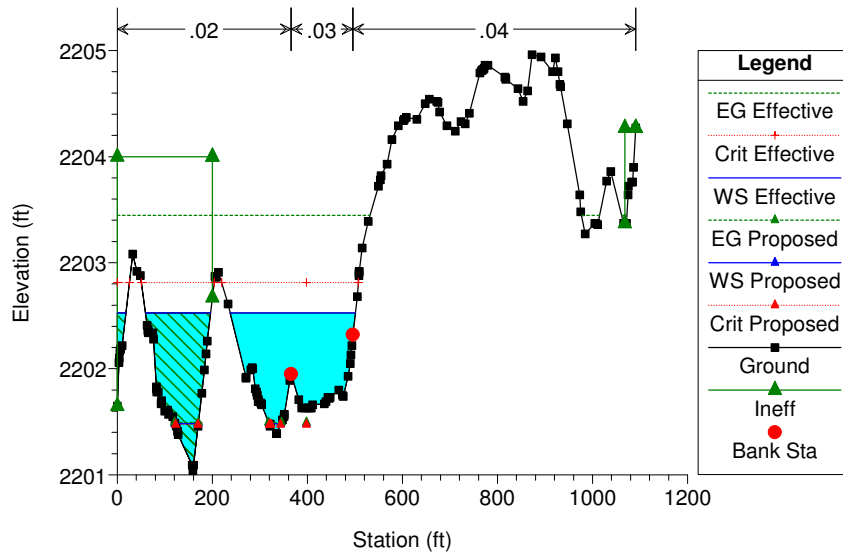
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

RS = 10302.11



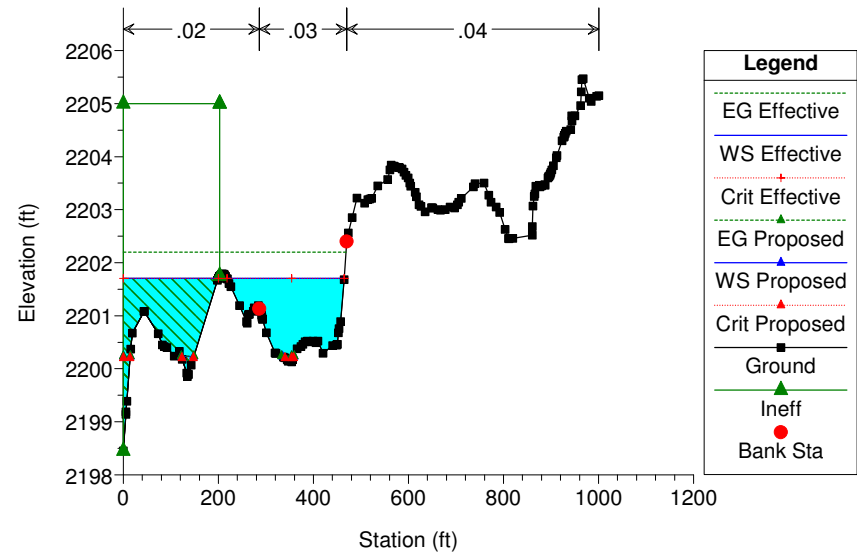
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

RS = 9875.193



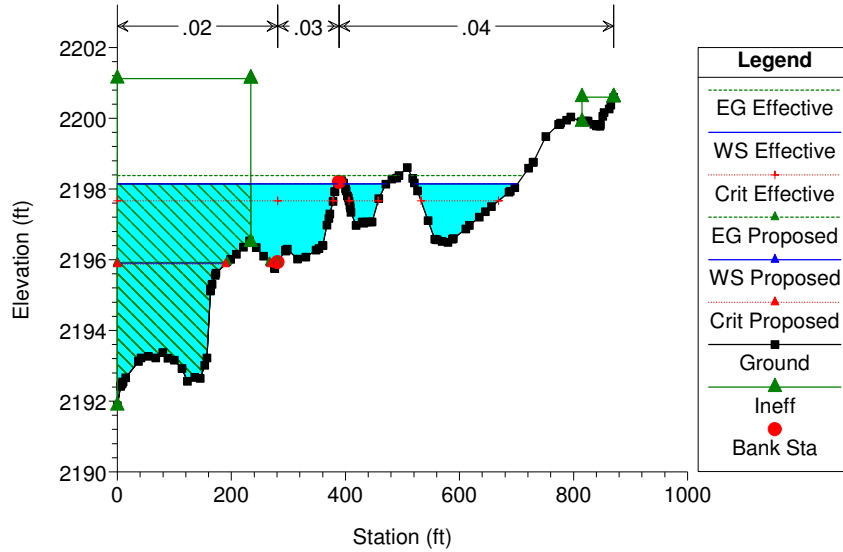
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

RS = 9730.641 63 ft S of Drive C of Rancho Air Cntr. 48" SD to 12x8 RCB



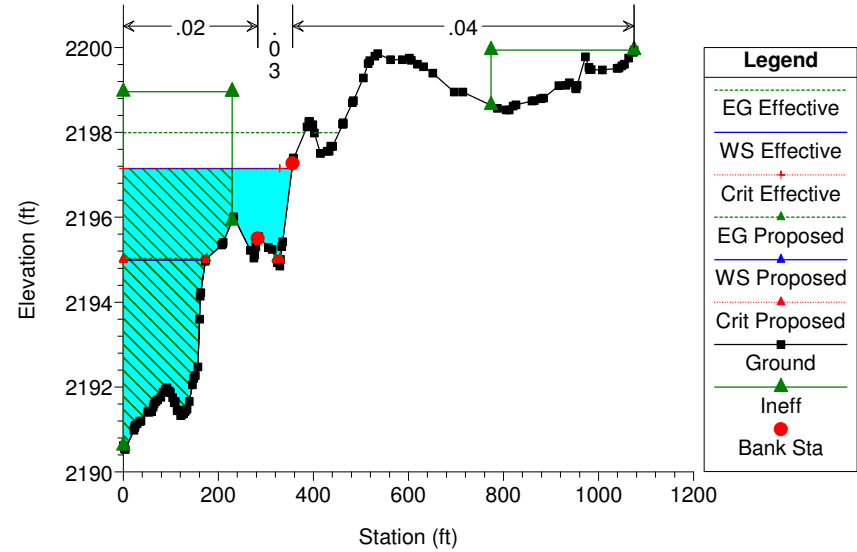
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

RS = 9032.391



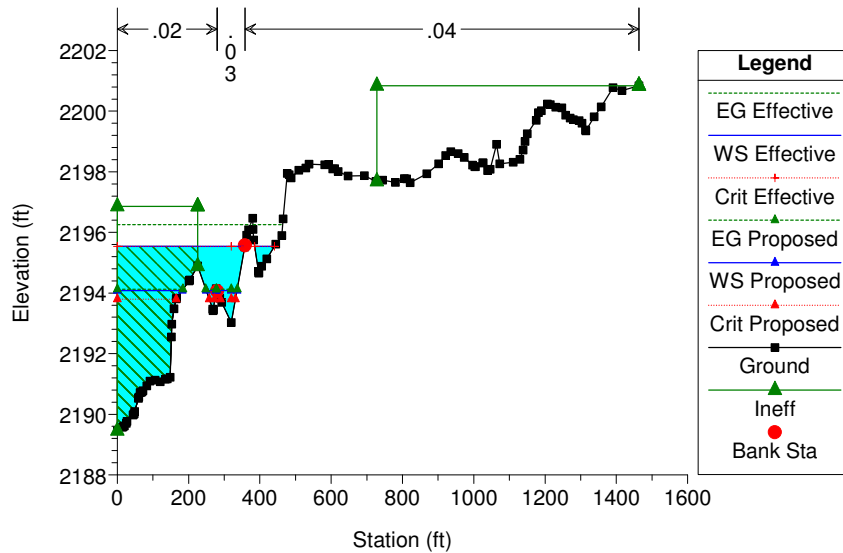
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

RS = 8935.525 53 feet south of Drive L of Rancho Air Center



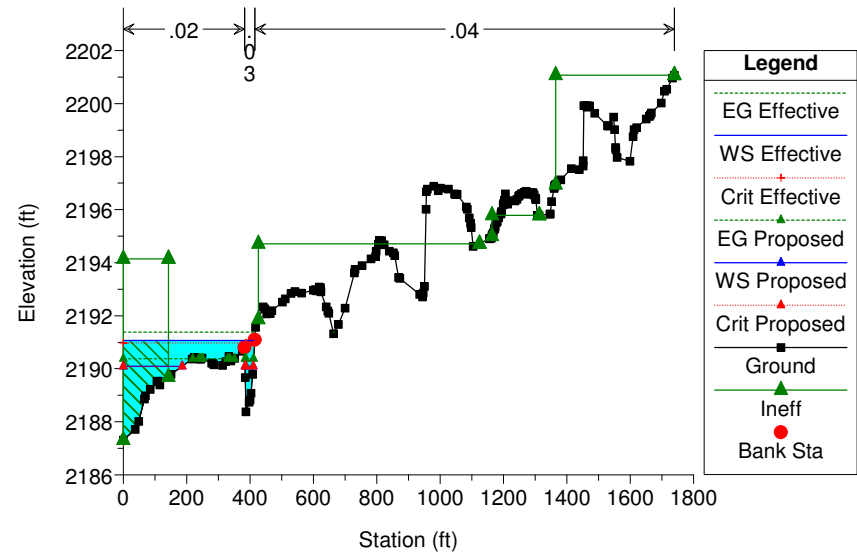
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

RS = 8765.933



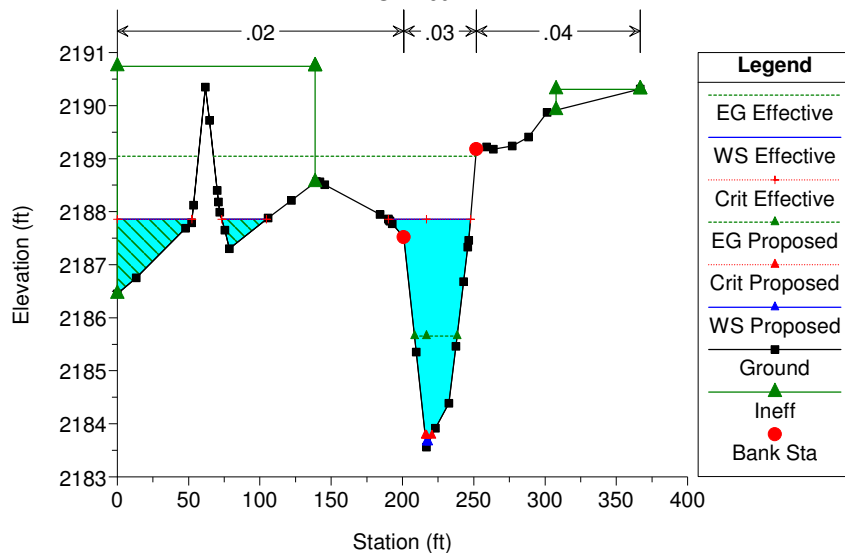
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

RS = 7977.189 Smoke Ranch Road



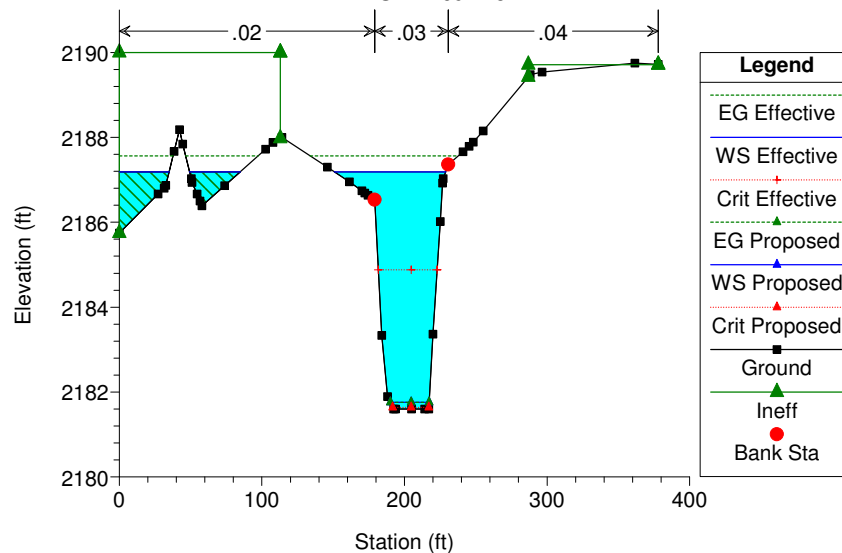
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

RS = 7607.411



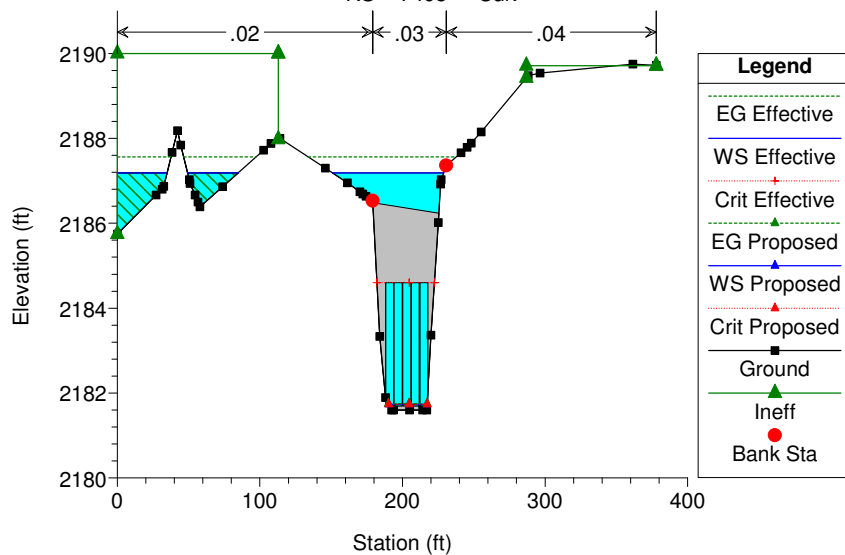
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

RS = 7469.225



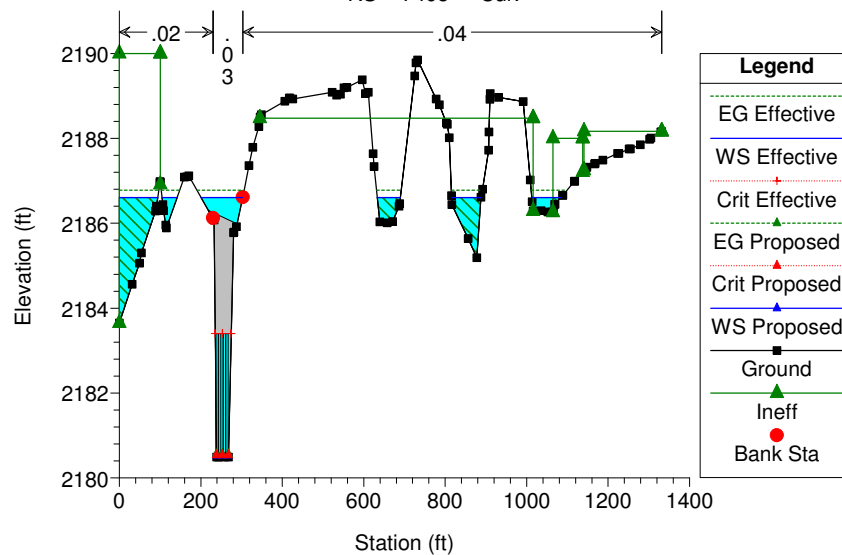
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

RS = 7405 Culv

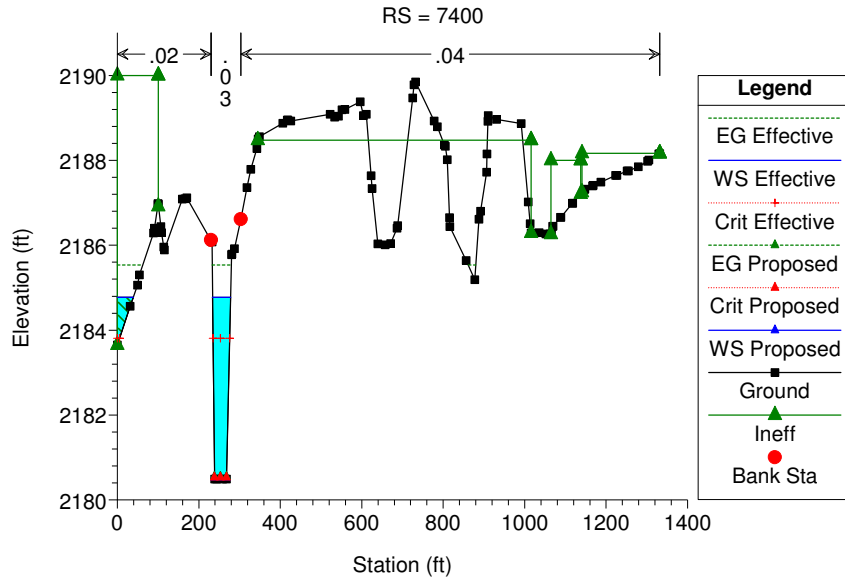


LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

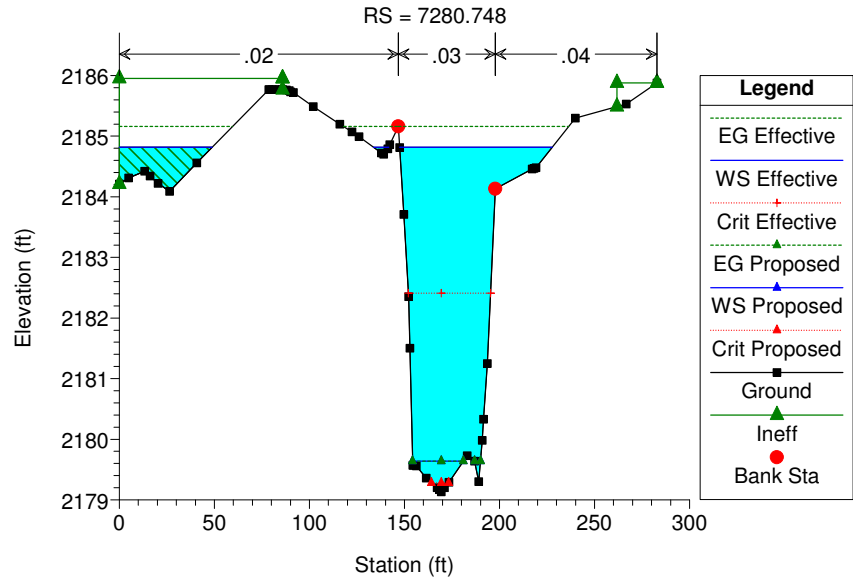
RS = 7405 Culv



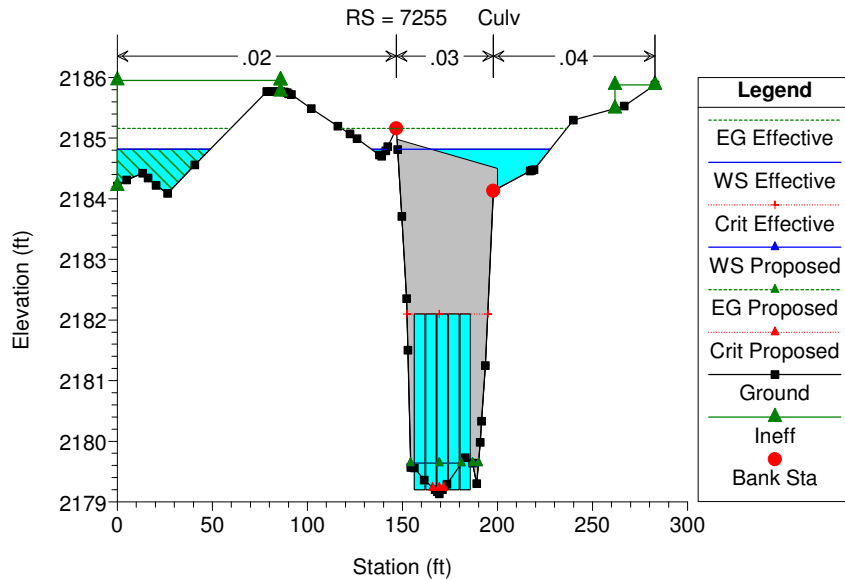
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018



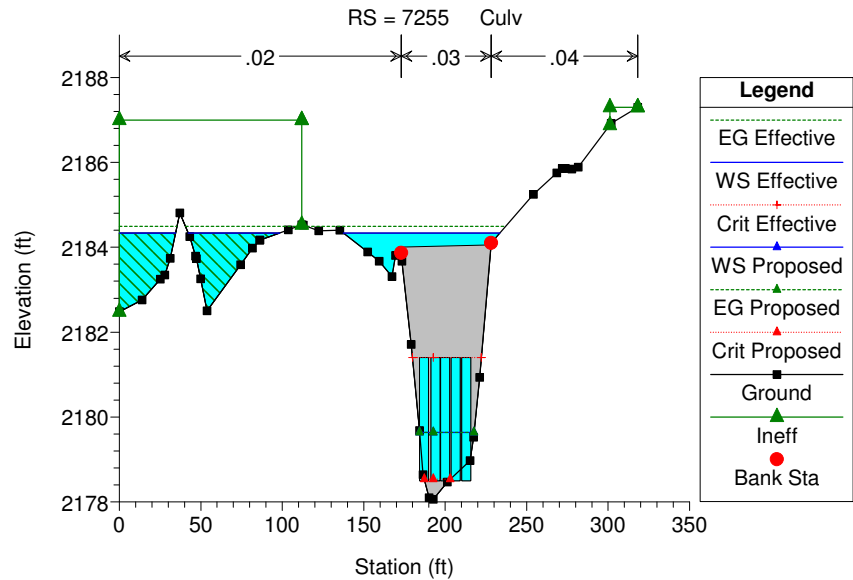
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018



LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

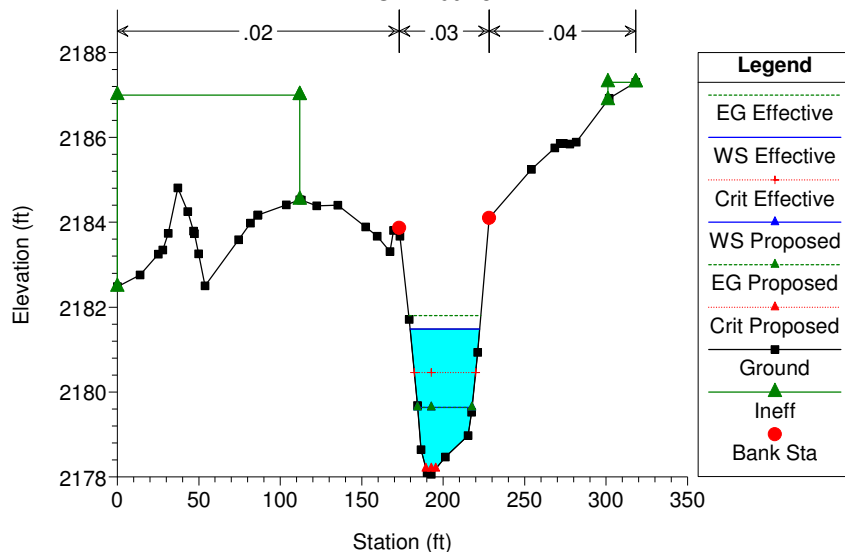


LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018



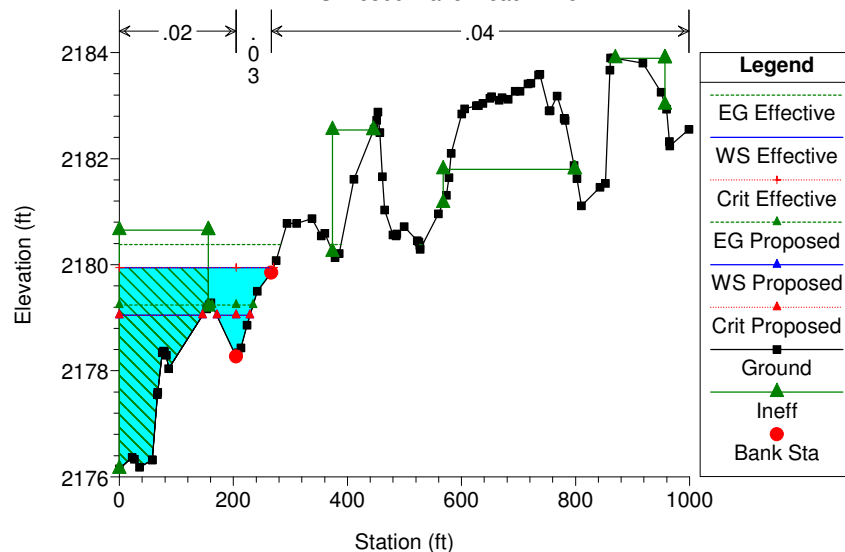
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

RS = 7190.137



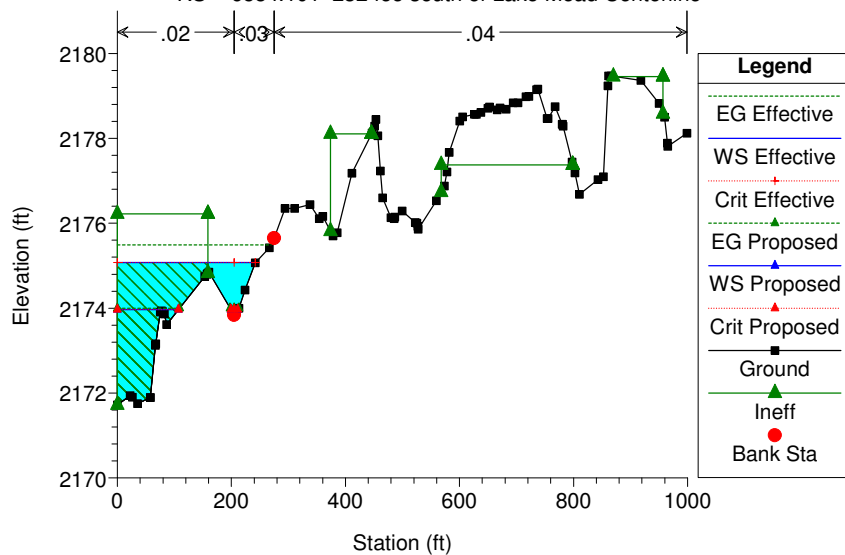
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

RS = 6800 Lake Mead Drive



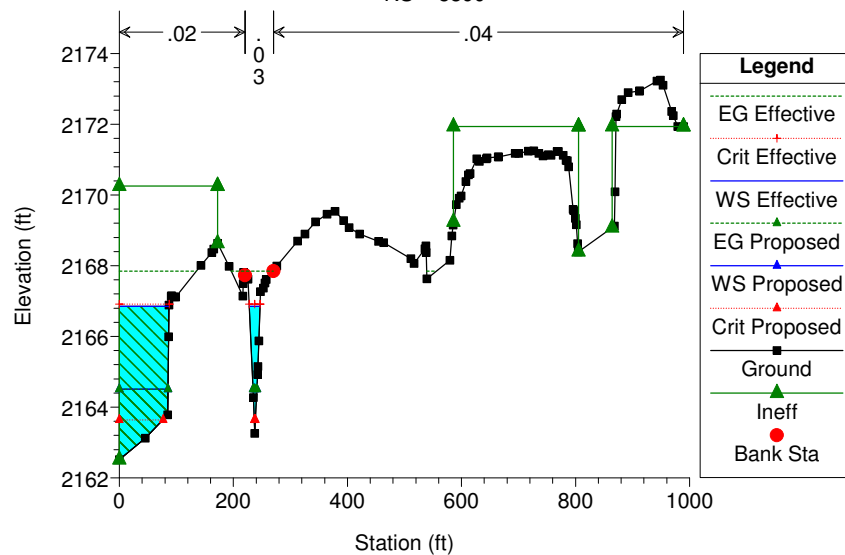
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

RS = 6584.101 232 fee south of Lake Mead Centerline

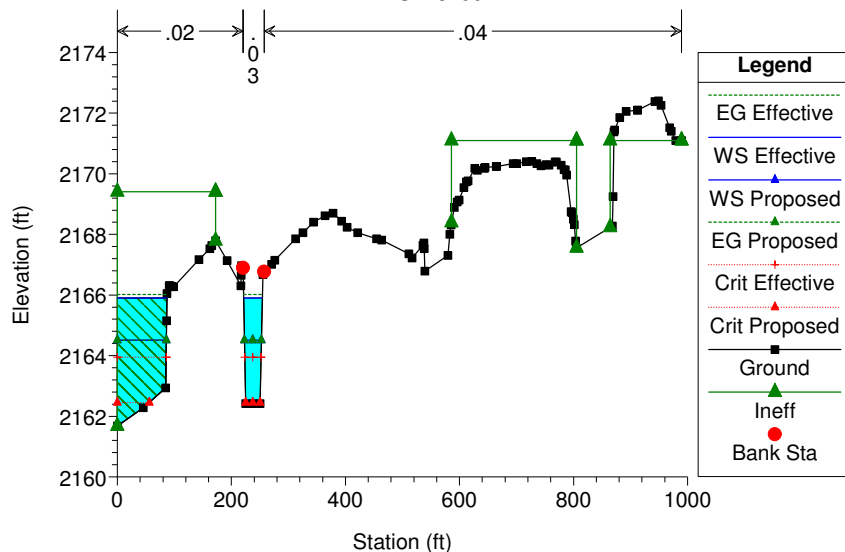


LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

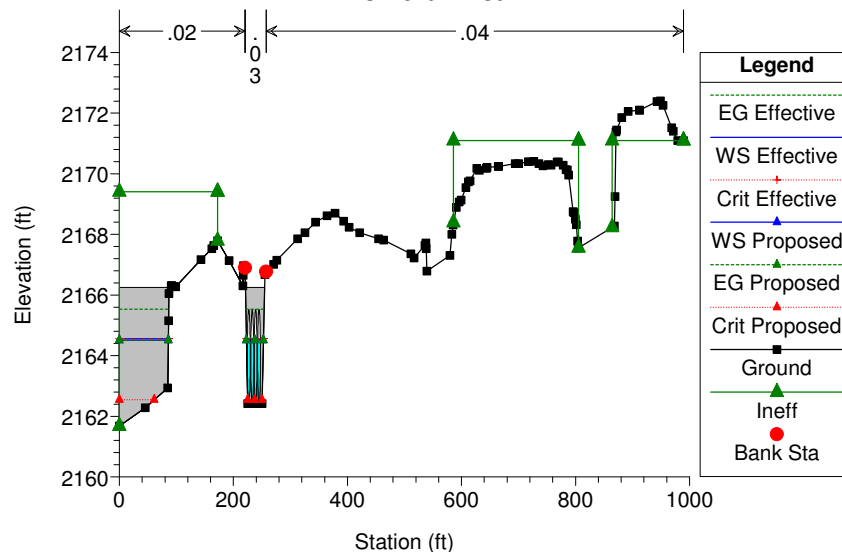
RS = 5890



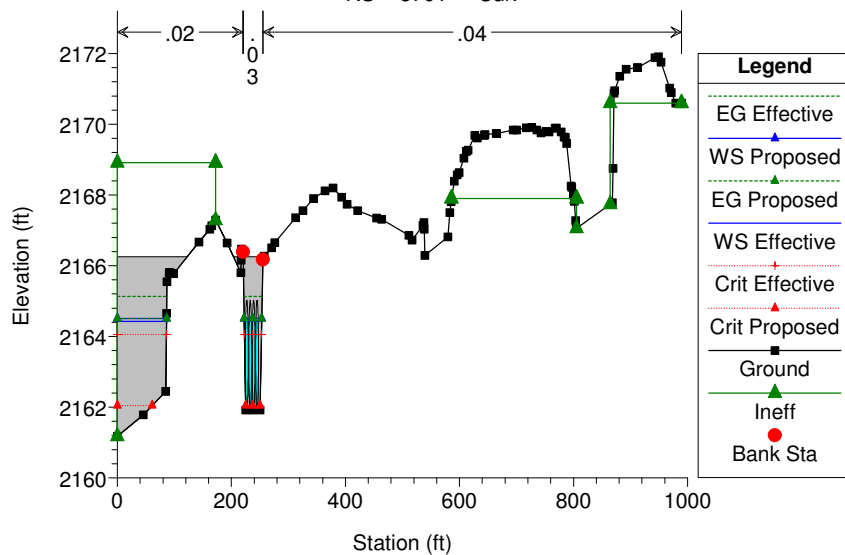
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018  
RS = 5790



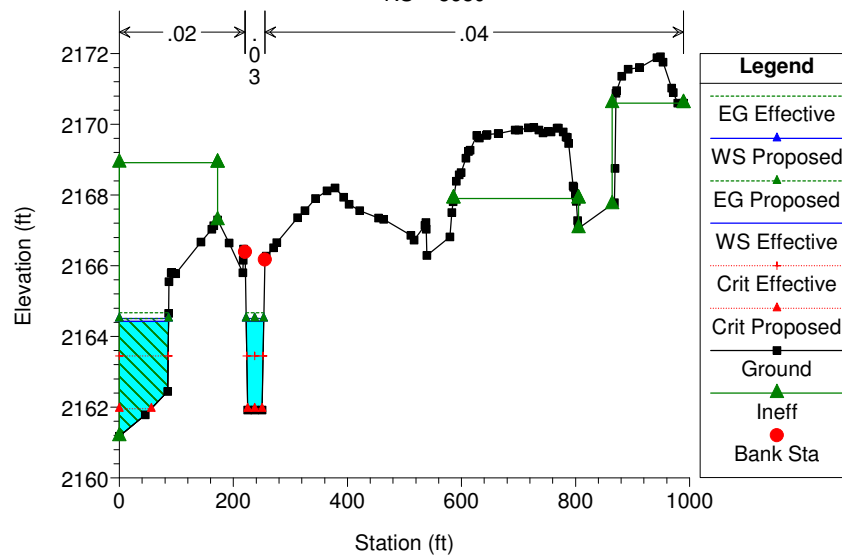
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018  
RS = 5701 Culv



LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018  
RS = 5701 Culv

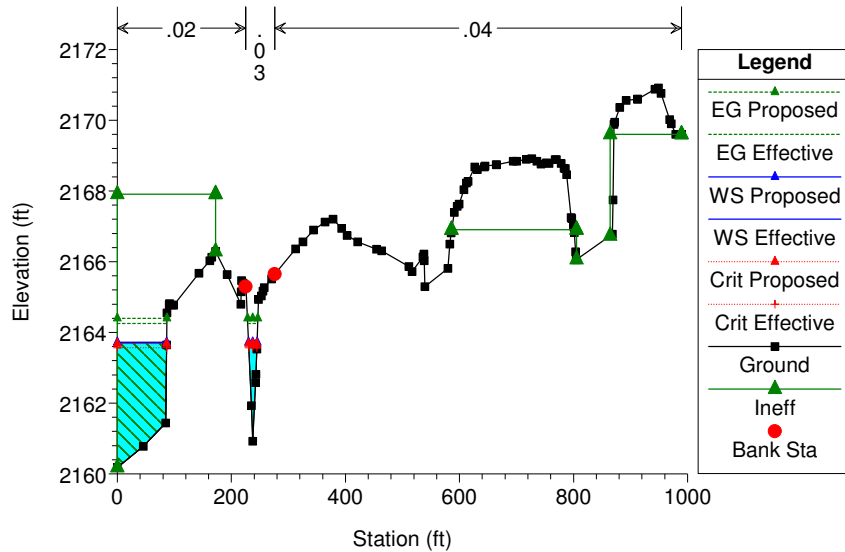


LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018  
RS = 5680



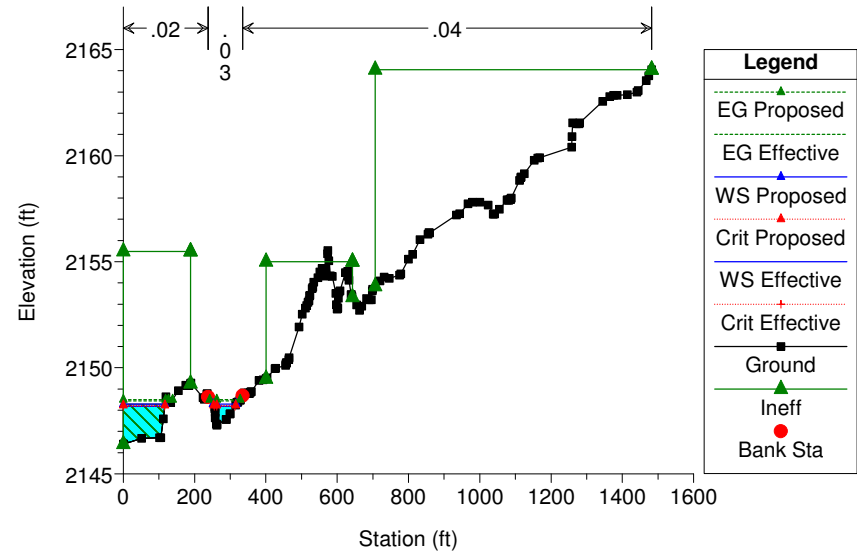
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

RS = 5560.176 838 feet north of Coran



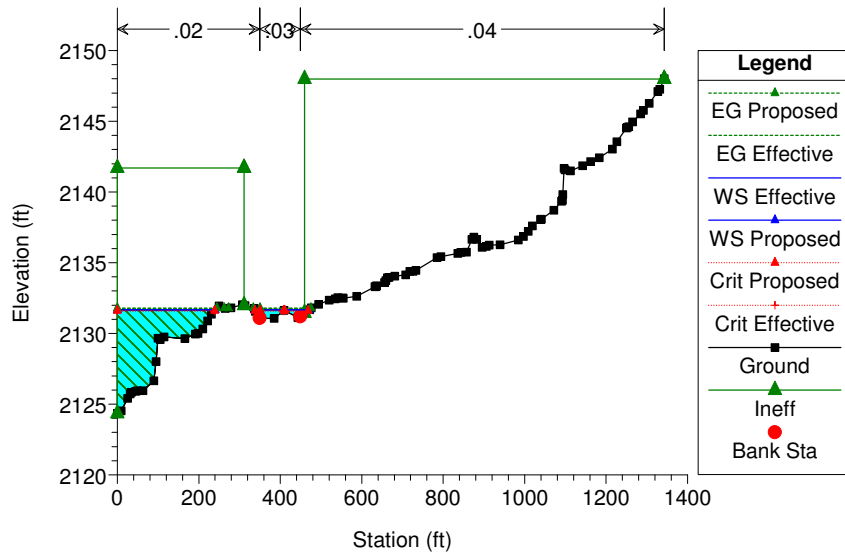
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

RS = 4255.943 487 feet south of Coran



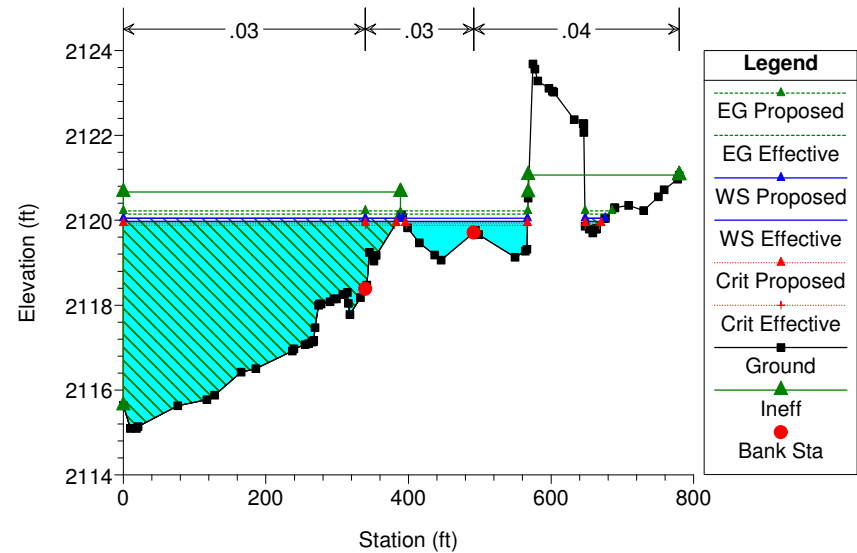
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

RS = 2839.724



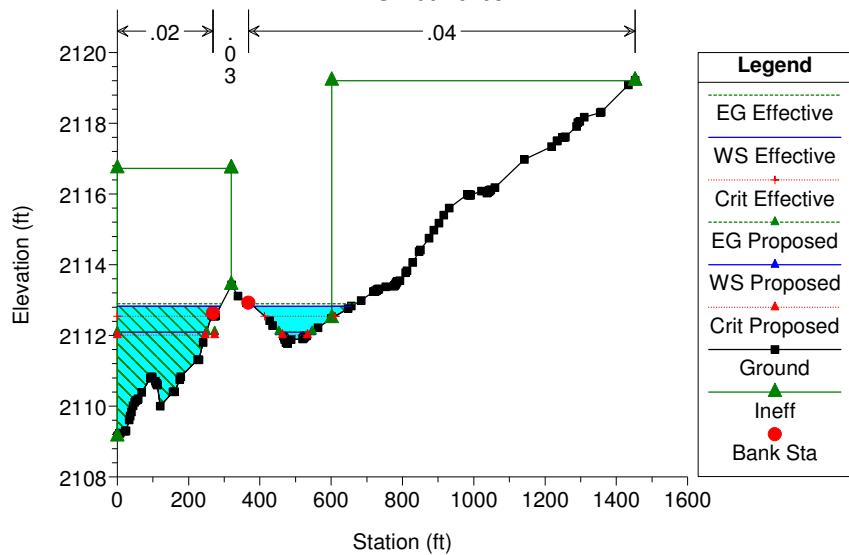
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

RS = 1723.771



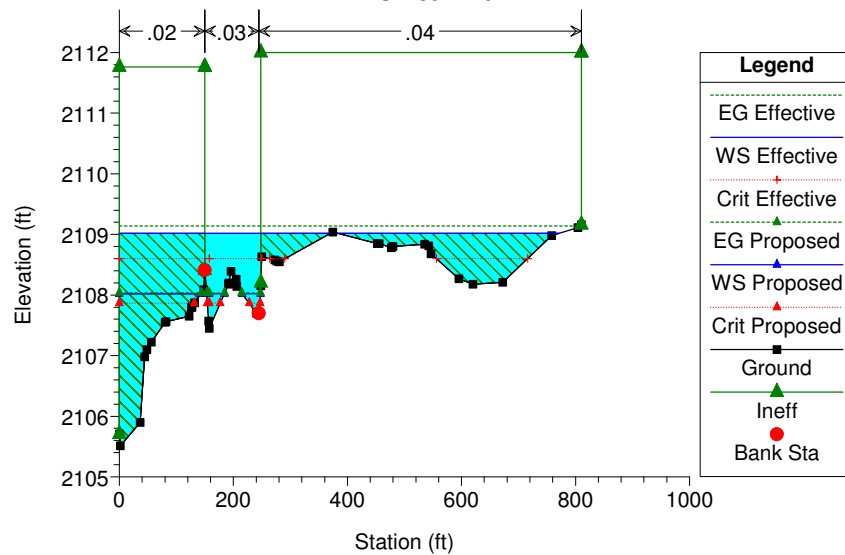
LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

RS = 907.9108



LOWER RANCHO STREET ONLY082806 Plan: Plan 01 2/9/2018

RS = 39.12192

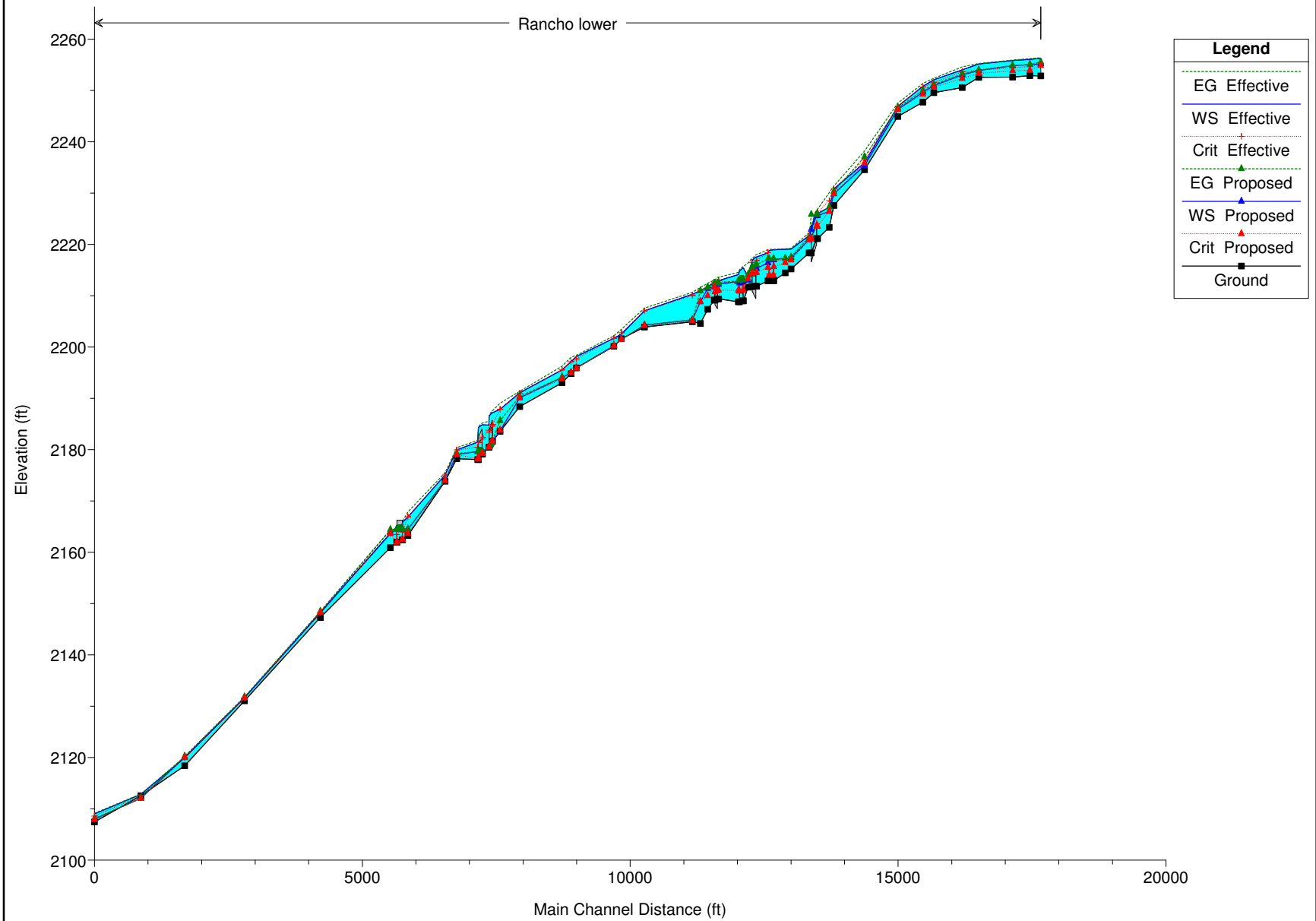




LOWER RANCHO STREET ONLY082806

Plan: Plan 01

2/9/2018



LOWER RANCHO STREET ONLY082806

Plan: Plan 01 2/9/2018

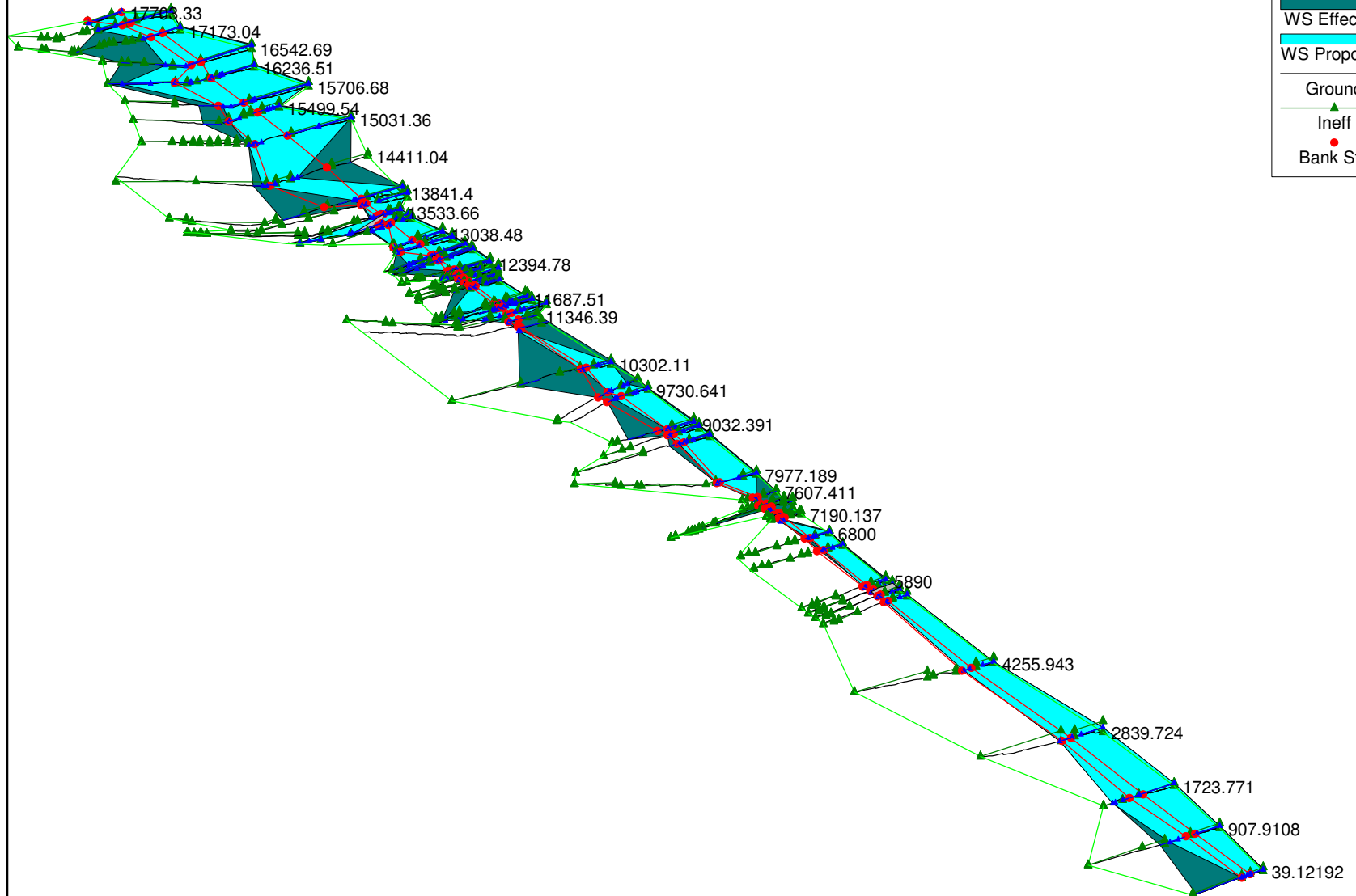
**Legend**

WS Effective  
WS Proposed

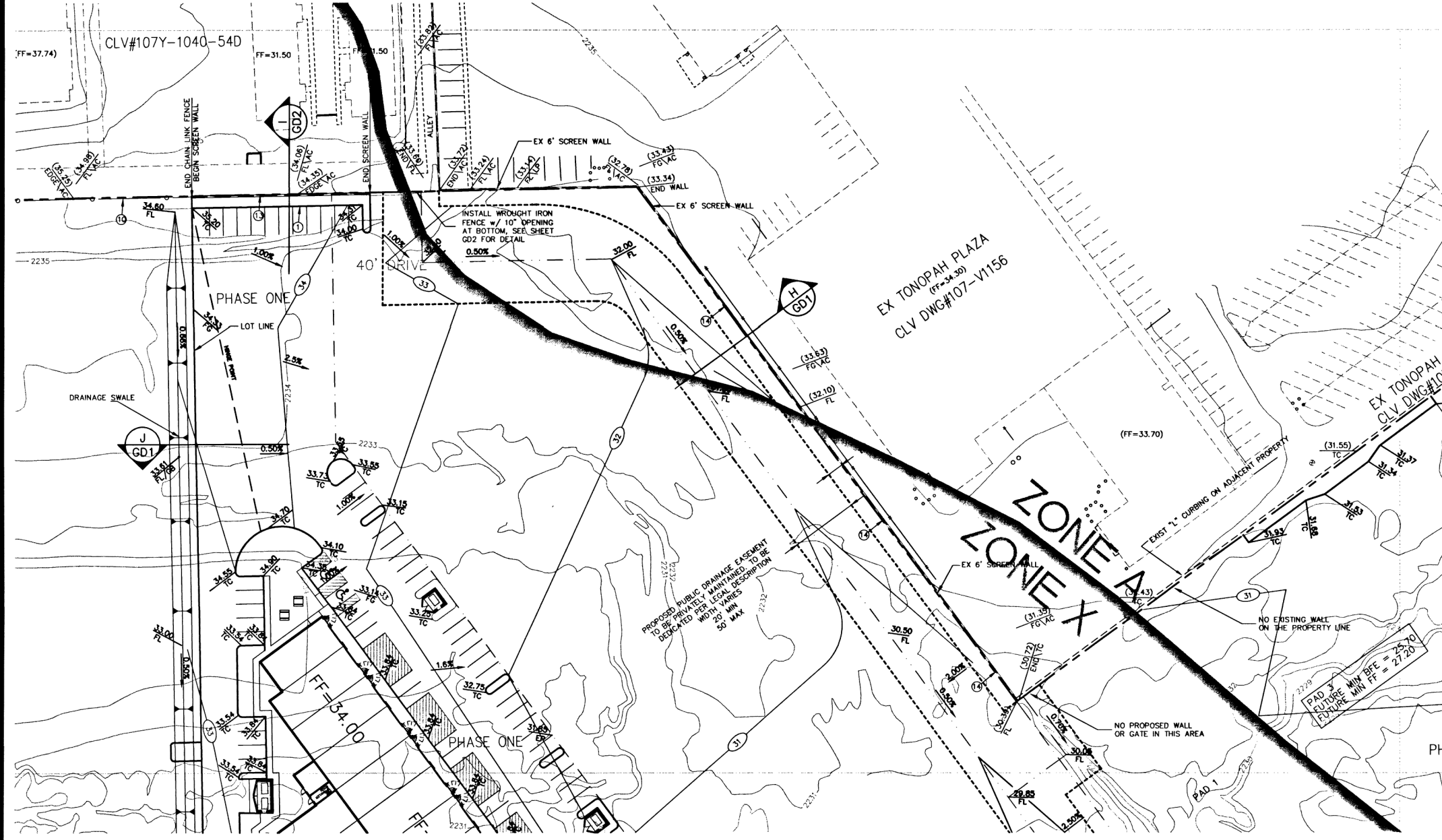
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# **Alpha Engineering**



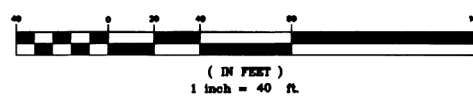
**BENCHMARK**

CITY OF LAS VEGAS BENCHMARK NO. 1LV001254 RIVET & PLATE IN TOP OF CURB, NORTHEAST RETURN OF CHEYENNE & MICHAEL WAY.  
ELEVATION 688.1680 METERS. (2251.203 U.S. SURVEY FEET) NAVD 1988 DATUM  
METERS x (39.37/1200) = U.S. SURVEY FEET  
1. THE ELEVATIONS SHOWN HEREON ARE BASED ON FEET.

**BASIS OF BEARING**

SOUTH 36°26'48" EAST, BEING THE BEARING OF THE CENTERLINE OF US HWY 95 (RANCHO DRIVE) AS SHOWN BY A MAP ON FILE IN THE OFFICE OF THE CLARK COUNTY, NEVADA RECORDER AS FILE 28, PAGE 83 OF PARCEL MAPS.

**GRAPHIC SCALE**



**CONSTRUCTION NOTES:**

1. CONSTRUCT "A" TYPE CURB PER CC STD DWG NO. 219
2. CONSTRUCT "L" TYPE CURB AND GUTTER PER CC STD DWG NO. 216
3. CONSTRUCT 2' CONCRETE VALLEY GUTTER, SEE DETAIL SHEET SECTION VG/GD2
4. CONSTRUCT 4' WIDE CONCRETE PAN FOR DRAINAGE OVERFLOW FROM EX TONOPAH PLAZA
5. CONSTRUCT 2' CONCRETE CURB OPENING OR CHANNEL, SEE DETAIL SHEET SECTION 2VG/GD2 TYPICAL.
6. CONSTRUCT 4' CONCRETE VALLEY GUTTER, SEE DETAIL SECTION
7. CONSTRUCT 8' CONCRETE VALLEY GUTTER PER USDOCA DWG NO. 228
8. CONSTRUCT HC RAMP CASE 1 PER CLV STD DWG NO. 235.  
A = B = 8.0'
9. CONSTRUCT SIDEWALK UNDERDRAIN PER CLV STD DWG NO. 236.
10. CONSTRUCT 6' CHAIN LINK FENCE AT PROPERTY LINE ADJACENT TO LOT 2
11. RELOCATE UTILITY POLE
12. PROPOSED PYLON SIGN, ONE COLUMN
13. CONSTRUCT 8' HIGH SCREEN WALL AT PROPERTY LINE ADJACENT TO PHASE 1 OF LOT 1  
CONSTRUCT APPROXIMATELY 115 LF OF WALL. DO NOT BUILD WALL ACROSS DRIVEWAY.  
WROUGHT IRON FENCE TO BE INSTALLED AS SHOWN ADJACENT TO ALLEY
14. ADD 3 ADDITIONAL COURSES OF BLOCK TO EXISTING 6' SCREEN WALL
15. SAWCUT A MIN. 12" INTO EXISTING EDGE OF PAVEMENT ALONG PROPOSED DECELERATION LANE AND CROSS GUTTER AT PRIVATE ACCESS ENTRANCE

"I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE WITH THE CITY OF LAS VEGAS FOR THIS PROJECT."

Stephen F. Crevoiserat, P.E. #13689

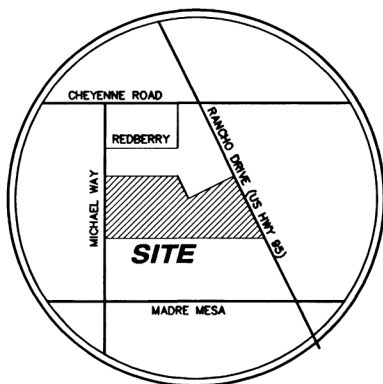
6-20-00  
DATE

**LANDSCAPE NOTE:**

SEE LANDSCAPE PLANS FOR ALL INTERIOR SIDEWALK LOCATIONS WITHIN ONSITE PLANTER AREAS AND FOR ALL IRRIGATION CONNECTIONS TO PRIVATE ONSITE MAIN.

FOR CONTINUATION SEE SHEET G2

FOR CONTINUATION SEE SHEET G3



**LOCATION MAP**

ALPHA ENGINEERING ASSUMES NO RESPONSIBILITY FOR EXISTING UTILITY LOCATIONS AND ELEVATIONS. THE UTILITIES SHOWN ON THIS DRAWING HAVE BEEN PLOTTED FROM THE BEST AVAILABLE INFORMATION. IT IS, HOWEVER, THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE LOCATION AND ELEVATION OF ALL UTILITIES PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION. CONTRACTOR TO FIELD VERIFY ALL EXISTING SITE CONDITIONS PRIOR TO CONSTRUCTION. IF A CONFLICT EXISTS BETWEEN WHAT IS SHOWN ON THESE DRAWING AND WHAT EXISTS IN THE FIELD, THE CONTRACTOR IS TO NOTIFY THE ARCHITECT OR ENGINEER IMMEDIATELY.

ZONE X AREA IS DETERMINED TO BE OUTSIDE 500-YEAR FLOODPLAIN. ZONE A AREA IS A SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD WITH NO BASE FLOOD ELEVATIONS DETERMINED.

| BACK OF CURB<br>Bearing Table |               |          |
|-------------------------------|---------------|----------|
| No.                           | Bearing       | Distance |
| L1                            | N 53°33'12" E | 129.52'  |
| L2                            | N 53°33'12" E | 259.67'  |
| L3                            | N 53°33'12" E | 249.67'  |
| L4                            | S 36°26'48" E | 17.47'   |
| L5                            | N 53°33'12" E | 59.67'   |
| L6                            | N 53°33'12" E | 47.00'   |
| L7                            | N 88°55'30" E | 78.12'   |
| L8                            | N 53°33'12" E | 62.82'   |
| L9                            | N 53°33'12" E | 116.14'  |
| L10                           | N 53°33'12" E | 2.91'    |
| L11                           | N 53°33'12" E | 28.13'   |
| L12                           | N 53°33'12" E | 46.32'   |
| L13                           | N 50°00'20" E | 132.22'  |
| L14                           | N 57°06'04" E | 123.09'  |
| L15                           | S 53°36'43" W | 100.36'  |
| L16                           | N 53°45'47" E | 101.96'  |
| L17                           | N 53°33'12" E | 17.95'   |
| L18                           | N 52°39'55" E | 129.05'  |
| L19                           | N 54°26'29" E | 128.28'  |
| L20                           | N 53°35'24" E | 18.72'   |
| L21                           | N 55°19'38" E | 6.19'    |
| L22                           | N 53°33'12" E | 75.22'   |
| L23                           | N 36°26'48" W | 200.00'  |
| L24                           | N 53°33'12" E | 43.22'   |
| L25                           | S 51°46'46" W | 6.19'    |
| L26                           | N 36°26'48" W | 15.00'   |
| L27                           | N 53°33'12" E | 20.00'   |
| L28                           | N 88°55'30" E | 470.57'  |

| BACK OF CURB<br>Curve Table |         |            |        |         |
|-----------------------------|---------|------------|--------|---------|
| No.                         | Radius  | Delta      | Length | Tangent |
| C1                          | 100.00' | 35°22'18"  | 61.74' | 31.89'  |
| C2                          | 4.00'   | 180°00'00" | 12.57' | 0.00'   |
| C3                          | 65.00'  | 27°00'44"  | 30.64' | 15.61'  |
| C4                          | 10.00'  | 156°55'10" | 27.39' | 48.98'  |
| C5                          | 25.53'  | 81°31'26"  | 36.33' | 22.01'  |
| C6                          | 10.00'  | 126°52'12" | 22.14' | 20.00'  |
| C7                          | 25.00'  | 53°07'48"  | 23.18' | 12.50'  |
| C8                          | 12.06'  | 41°51'44"  | 8.81'  | 4.61'   |
| C9                          | 24.50'  | 56°38'38"  | 24.22' | 13.20'  |
| C10                         | 10.00'  | 134°09'45" | 23.42' | 23.65'  |
| C11                         | 25.00'  | 90°00'00"  | 39.27' | 25.00'  |
| C12                         | 100.00' | 06°08'36"  | 10.72' | 5.37'   |
| C13                         | 320.33' | 10°48'05"  | 60.39' | 30.28'  |
| C14                         | 6.00'   | 180°00'00" | 18.85' | 0.00'   |
| C15                         | 100.00' | 21°33'55"  | 37.64' | 19.04'  |
| C16                         | 100.00' | 12°00'55"  | 20.97' | 10.52'  |

**LEGEND - GRADING**

|                        |          |
|------------------------|----------|
| FUTURE IMPROVEMENTS    | ---      |
| EX. IMPROVEMENTS       | ---      |
| BLOCK RETAINING WALL   | =====    |
| BLOCK WALL             | =====    |
| EXIST BLOCK WALL       | =====    |
| INDEX CONTOUR          | ~~~~~    |
| INTERMEDIATE CONTOUR   | ~~~~~    |
| SEWER EASEMENT         | -----    |
| MATCHLINE              | =====    |
| DRAINAGE EASEMENT      | -----    |
| FLOOD ZONE DESIGNATION | =====    |
| FINISH FLOOR           | FF=99.99 |
| LIMITS OF INUNDATION   | -----    |
| CENTERLINE             | -----    |
| RIGHT OF WAY           | -----    |
| PHASE LINE             | -----    |
| PROPERTY/LOT LINE      | -----    |
| FLOW LINE              | -----    |

**NOTICE!**

EXISTING UTILITIES ARE SHOWN ON PLANS FOR THE CONVENIENCE OF THE CONTRACTOR ONLY. THE CONTRACTOR IS RESPONSIBLE FOR THE PROTECTION OF ALL UTILITIES. THE ENGINEER BEARS NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR SHOWN INCORRECTLY.

**Call BEFORE YOU Dig**  
1-800-227-2600  
UNDERGROUND SERVICE (USA)

BECKER ENTERPRISES

GRADING PLAN NORTHWEST

SHEET 04-12-00

DRAWN BY: CWP

ENGINEERING COMPANY

RANCHO INDUSTRIAL PARK

04-12-00

DESIGNED BY: CWP

ALPHA &

04-12-00

CHECKED BY: SFC

PROJECT NO. 914635

SCALE 1"=40'

SHEET G1 OF 22 SHEETS

DRAWING NO. 1074-4631

REVISION

DATE

BY



# **Dwyer Engineering**

## BASIS OF BEARINGS

THE BEARING OF S 35°14'53" E BEING THE CENTERLINE OF RANCHO ROAD AS SHOWN ON FILE 60, PAGE 68 OF SURVEYS TOWNSHIP 20 SOUTH, RANGE 60 EAST, M.D.M., ON FILE IN THE CLARK COUNTY RECORDER'S OFFICE, CLARK COUNTY, NEVADA.

## BENCHMARK

BM 7C01-18W4, PG 20-61  
-N.W.A., CITY OF LAS VEGAS, VERTICAL CONTROL BOOK. RIVET AND PLATE IN TOP OF CURB, NE CORNER 5' NORTH OF RADIUS AT DECATUR BLVD. AND RANCHO ROAD.

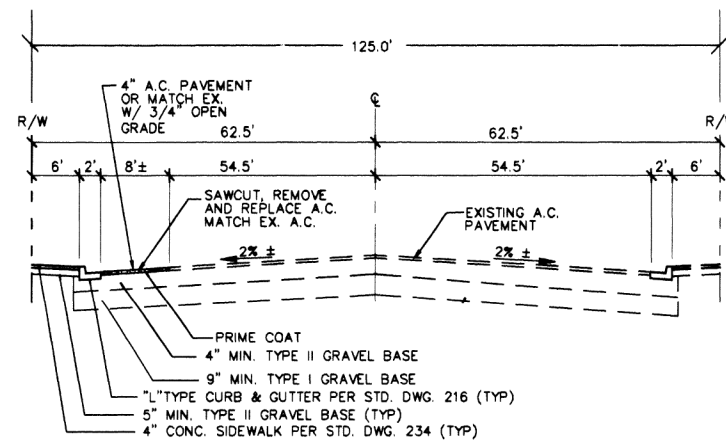
ELEVATION=2209.80' (673.5492 M)  
N.A.V.D. 1988

## OWNER/DEVELOPER

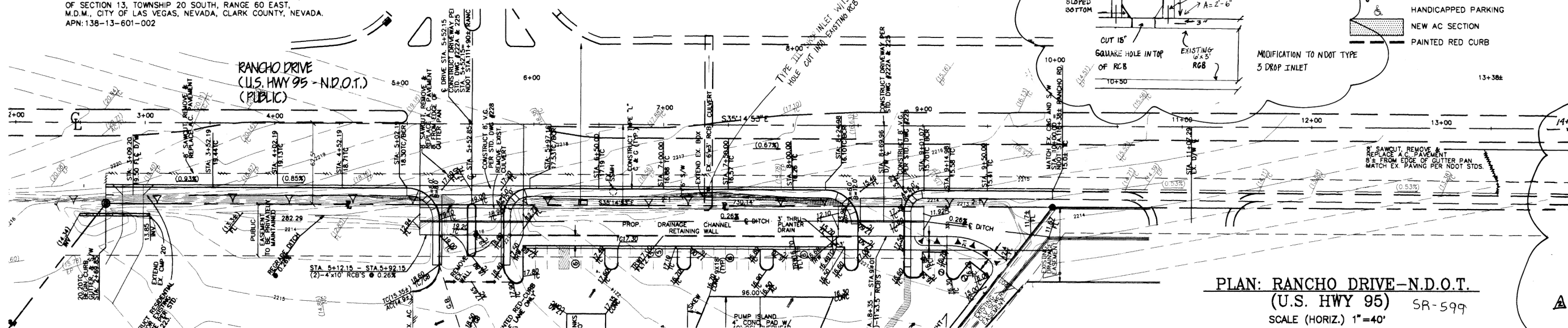
RANCHO OASIS, LTD.  
C/O CHARLES AND PHYLIS HAYES  
2991 NORTH RANCHO DRIVE  
LAS VEGAS, NEVADA 89130

## LEGAL DESCRIPTION

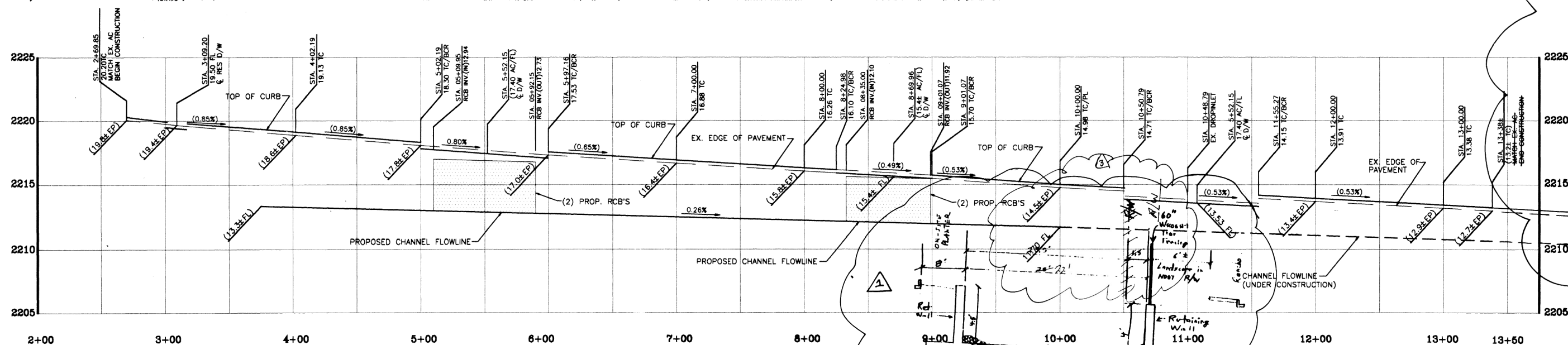
BEING A PORTION OF THE NORTHEAST QUARTER (NE 1/4) OF SECTION 13, TOWNSHIP 20 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, NEVADA, CLARK COUNTY, NEVADA.  
APN: 138-13-601-002



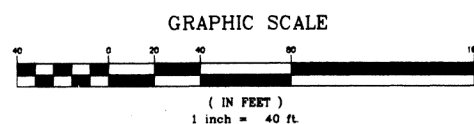
RANCHO DRIVE - N.D.O.T. RIGHT-OF-WAY  
CROSS-SECTION (TYPICAL)  
NTS



PLAN: RANCHO DRIVE - N.D.O.T.  
(U.S. HWY 95) SR-599  
SCALE (HORIZ.) 1"=40'



PROFILE: RANCHO DRIVE - N.D.O.T.  
(U.S. HWY 95)  
SCALE (HORIZ.) 1"=40'  
(VERT.) 1"=4'

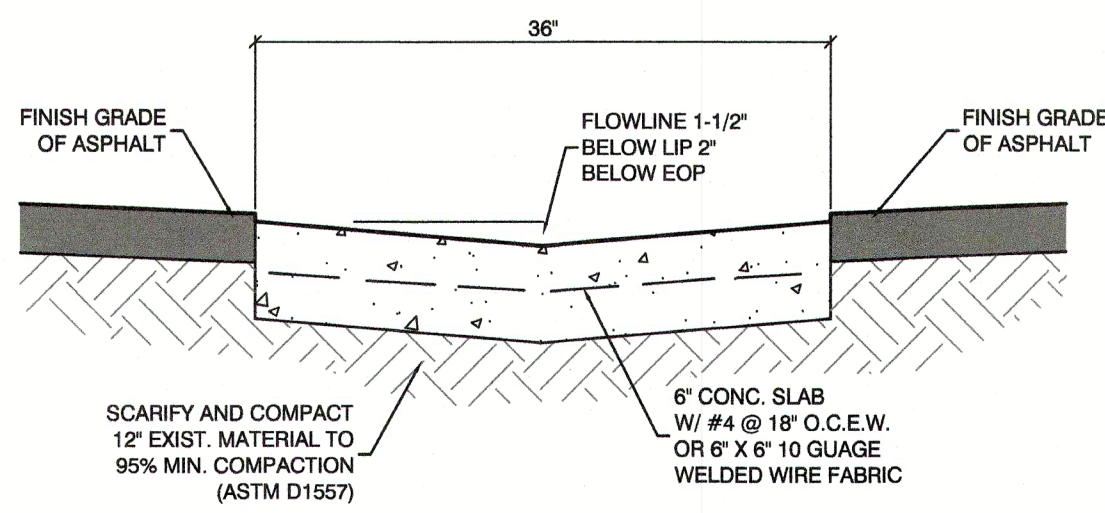


Avoid overhead power line contact.  
Call before you Overhead  
1-702-593-6111  
NEVADA POWER ENVIRONMENT SAFETY SERVICES DEPARTMENT

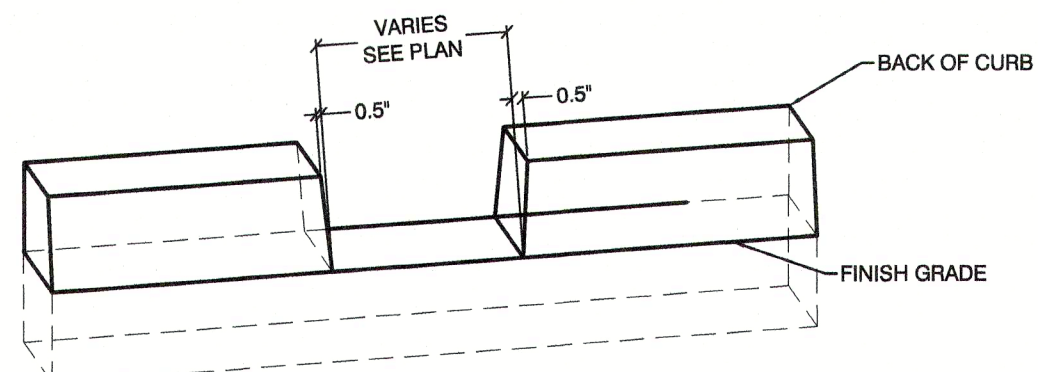


| REUSE OF DOCUMENTS                                                                                                                                                                                                                                                                                                                                               |                                        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| THIS DOCUMENT AND THE DATA AND DESIGN INFORMATION CONTAINED HEREIN ARE THE PROPERTY OF DYER ENGINEERING, INC. AND ARE NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN PERMISSION OF DYER ENGINEERING, INC. |                                        |
| APPROVED                                                                                                                                                                                                                                                                                                                                                         | DATE                                   |
| 9/1/99                                                                                                                                                                                                                                                                                                                                                           | 9/1/99                                 |
| REVISIONS                                                                                                                                                                                                                                                                                                                                                        | DESCRIPTION                            |
| 1                                                                                                                                                                                                                                                                                                                                                                | DRUG INLET DETAIL, ALTERNATIVE CHANNEL |
| 2                                                                                                                                                                                                                                                                                                                                                                | EXTENDED PAVEMENT REPLACEMENT          |
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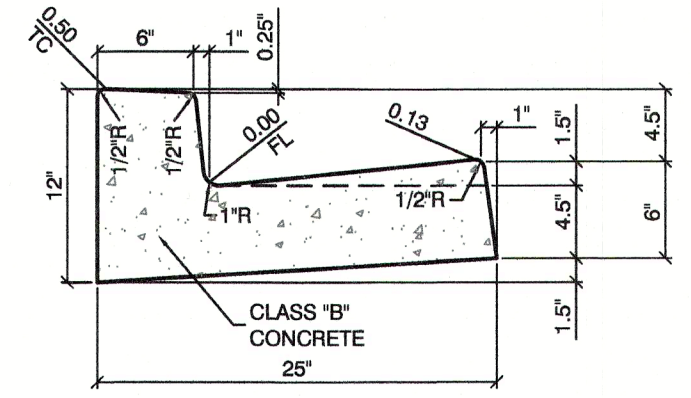




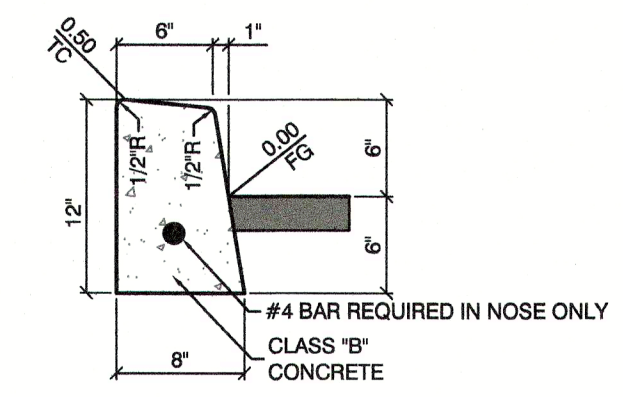
**36" WIDE VALLEY GUTTER  
WITHIN PAVING AREAS**  
NTS



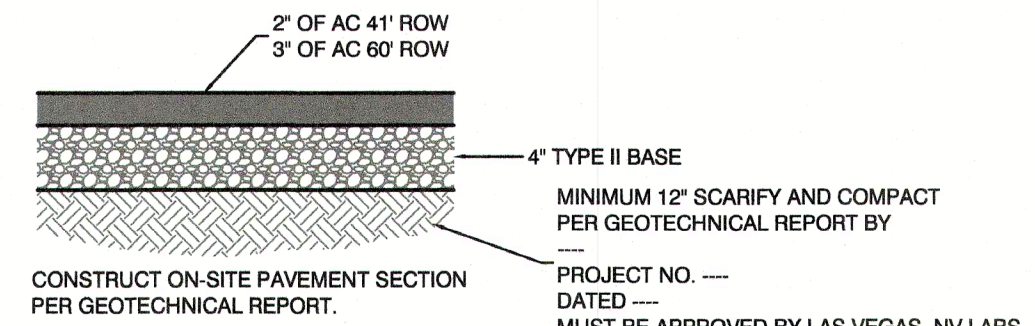
**DEPRESSED "A" CURB**  
NTS



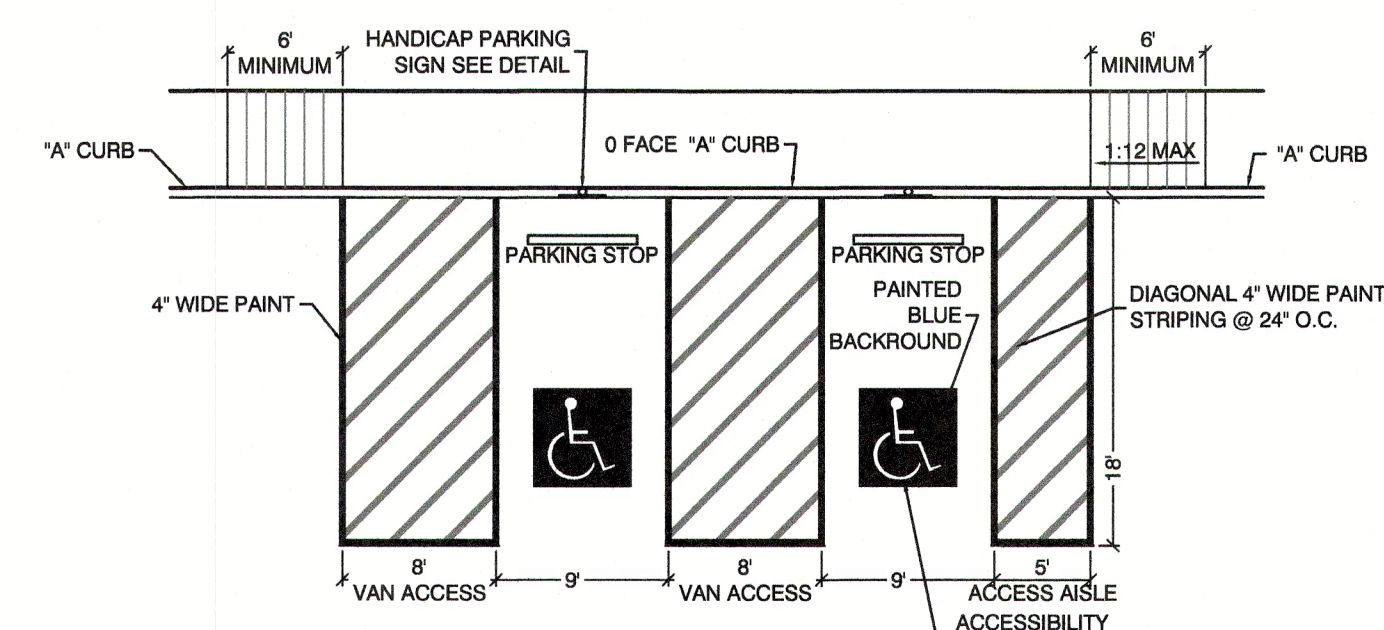
**"L" TYPE CURB & GUTTER**  
NTS  
REFER TO USD 216  
NOTES:  
1. 1" BATTER ON GUTTER FACE OPTIONAL.



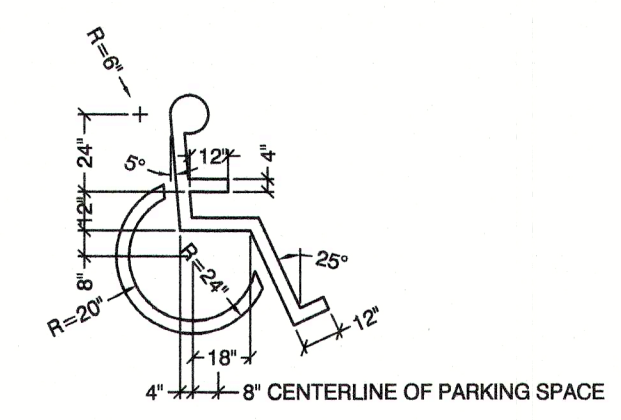
**"A" CURB PRIVATE SECTION**  
NTS  
REFER TO USD 219



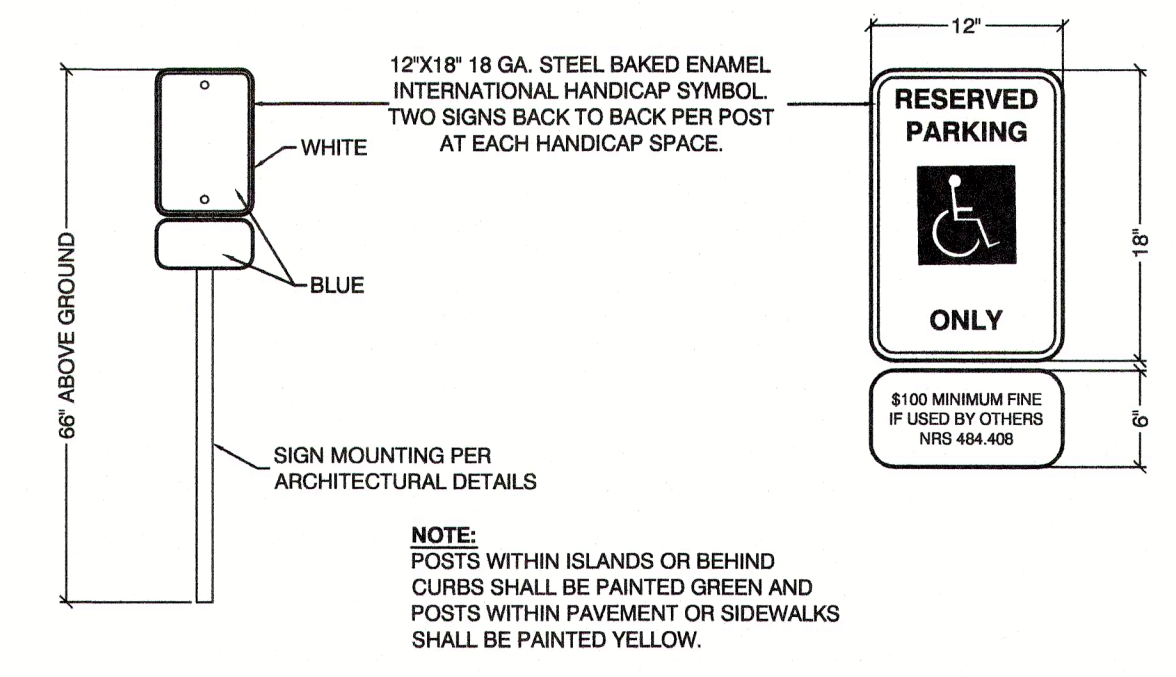
**ON-SITE ASPHALT CONCRETE  
PAVEMENT SECTION**  
NTS



**TYPICAL ACCESSIBLE PARKING DETAIL**  
NTS  
NOTE:  
MAINTAIN A MAXIMUM OF 2% SLOPE IN ANY DIRECTION ON PAVING.  
WITHIN HANDICAP PARKING SPACES AND PAINTED UNLOADING AREAS.

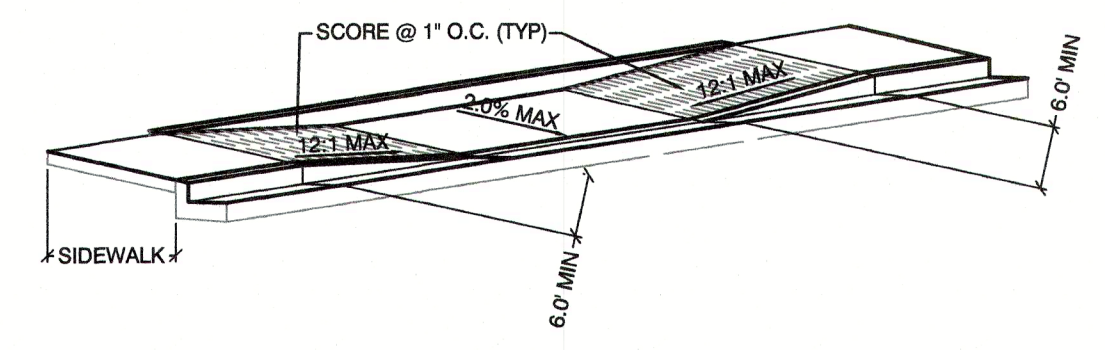


**HANDICAP SYMBOL DETAIL**  
NTS

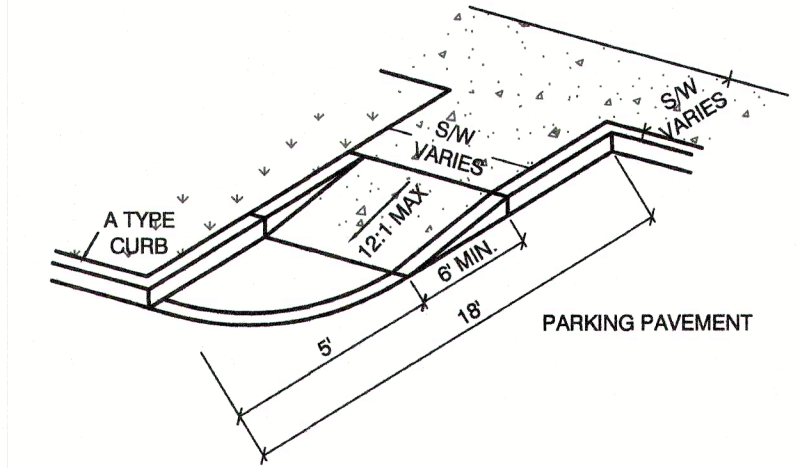


**HANDICAP SIGN DETAIL**  
NTS  
NOTE:  
POSTS WITHIN ISLANDS OR BEHIND CURBS SHALL BE PAINTED GREEN AND POSTS WITHIN PAVEMENT OR SIDEWALKS SHALL BE PAINTED YELLOW.

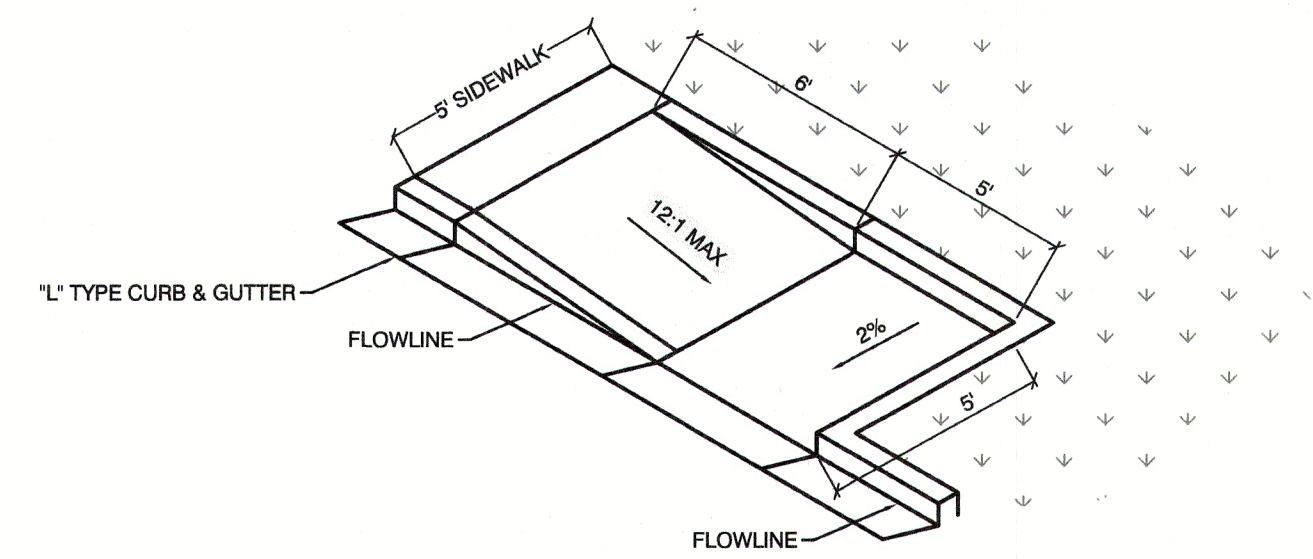
**NOTE:**  
ALL AGGREGATE BASES SHALL BE COMPACTED PER GEOTECHNICAL REPORT HTE #17-25526 PRELIMINARY PAVEMENT SECTIONS SHALL BE VERIFIED WITH THE FINAL PAVEMENT SECTION RECOMMENDATION REPORT (MPSR) PRIOR TO CONSTRUCTION. IF FINAL PAVEMENT SECTIONS ARE DIFFERENT, A REVISION TO THE IMPROVEMENT PLANS WILL BE REQUIRED.



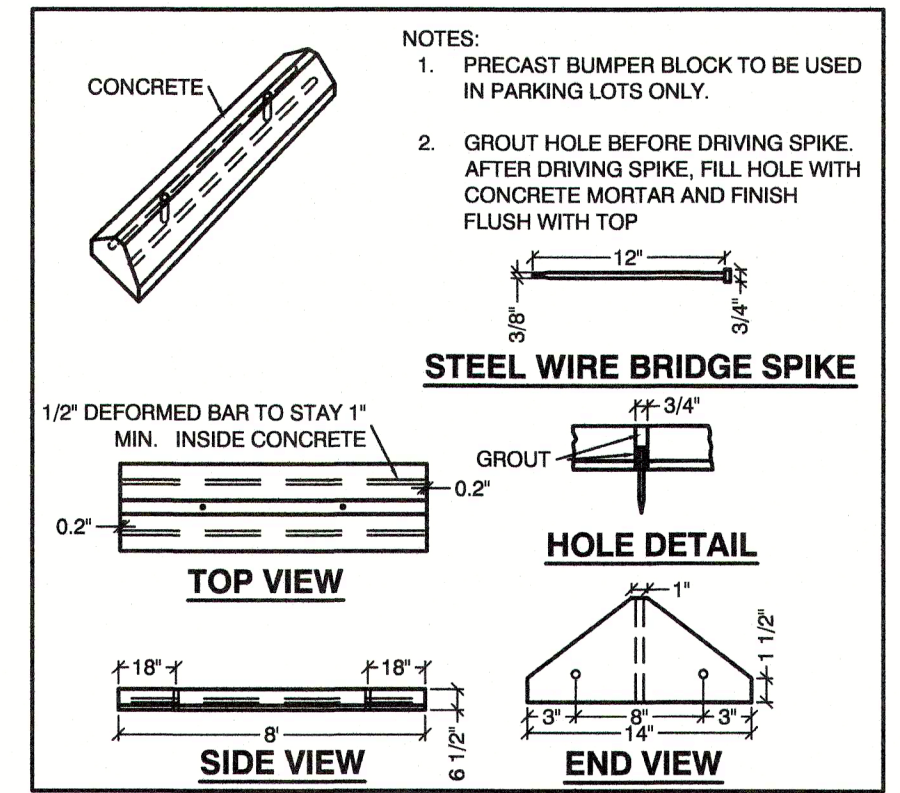
**DUAL SIDEWALK RAMP**  
NTS



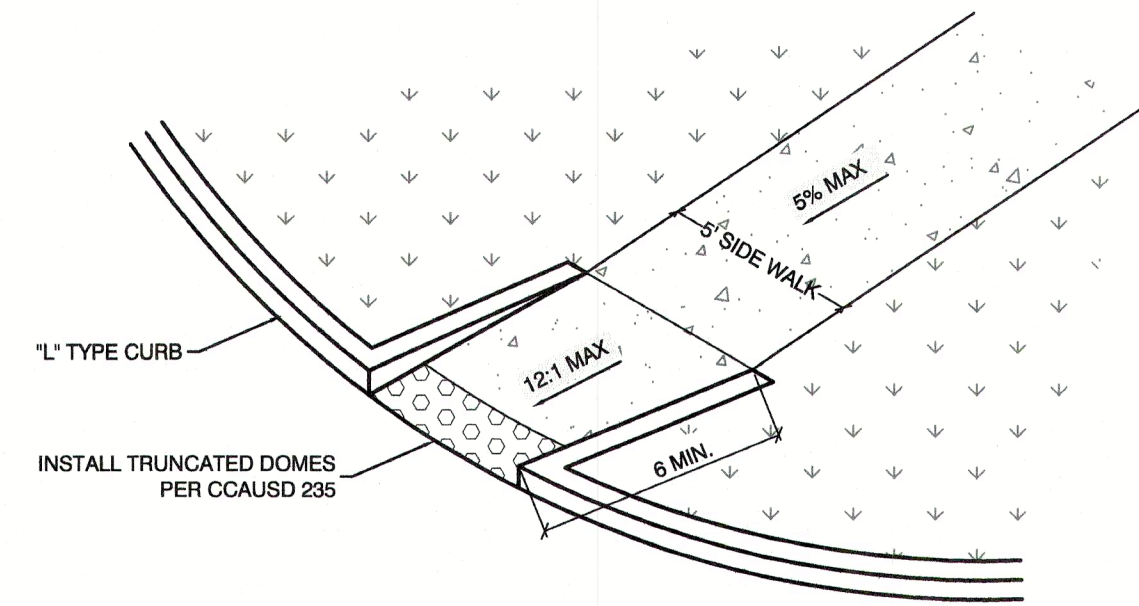
**SIDEWALK RAMP AT PARKING ISLAND OR BAY (PRIVATE)**  
N.T.S.



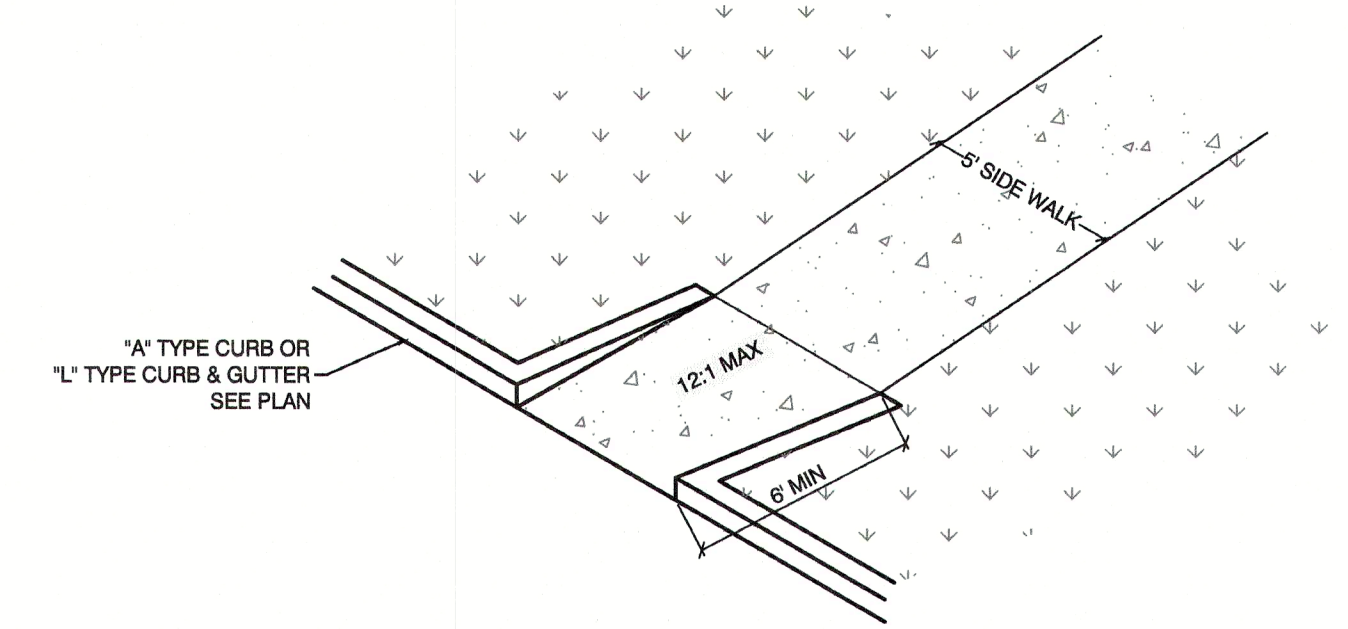
**SIDE WALK RAMP (PRIVATE)**  
NTS



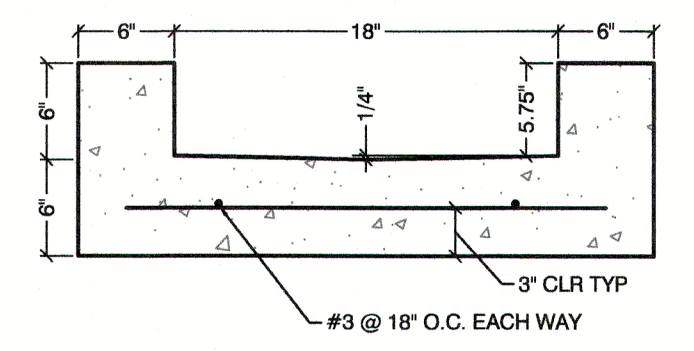
**TYPICAL PARKING STOP DETAIL**  
NTS



**SIDE WALK RAMP AT ENTRY DRIVEWAY**  
NTS



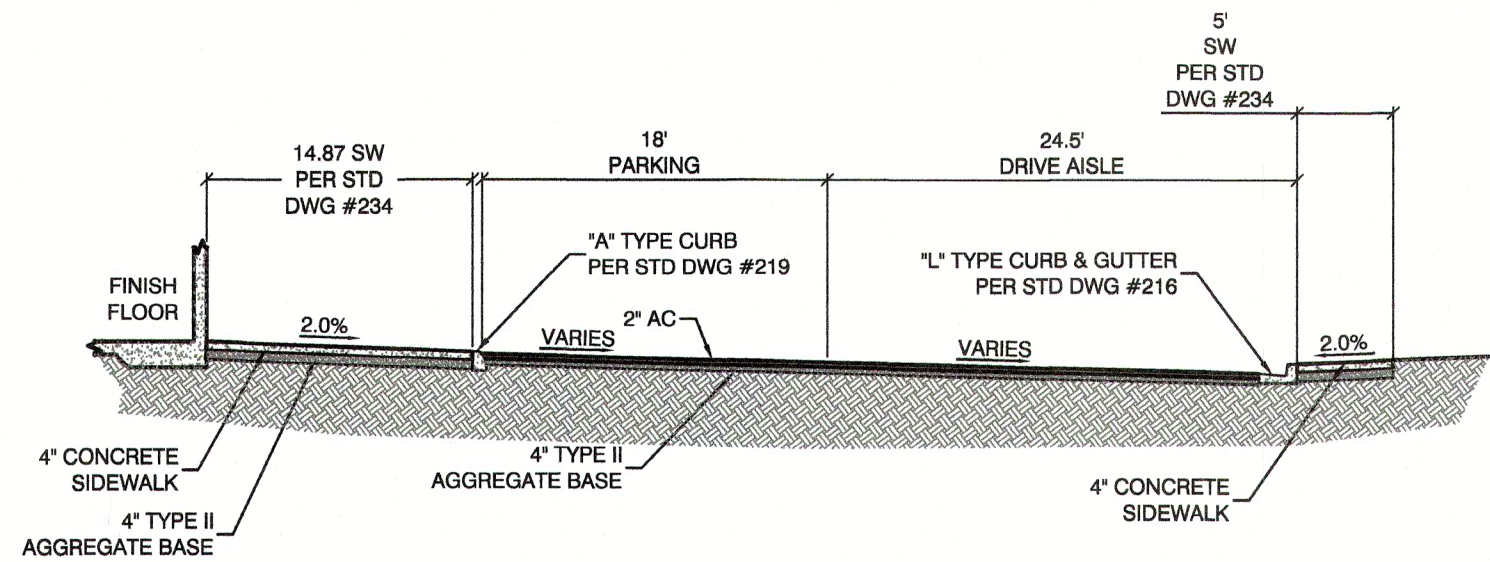
**SIDE WALK RAMP (PRIVATE)**  
NTS



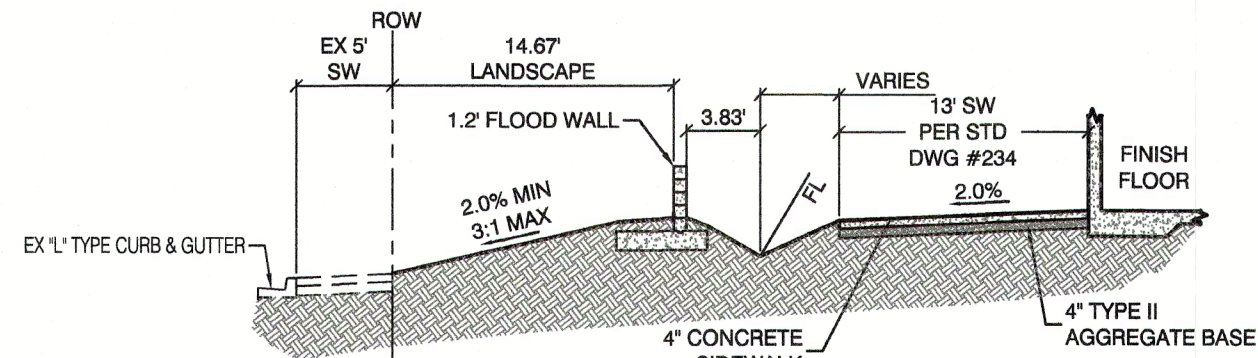
**"U" CHANNEL**  
NTS

|                                                                       |            |                                                                                                                                                                                               |            |
|-----------------------------------------------------------------------|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| EAB INVESTMENT COMPANY<br>2885 LAKESHORE DRIVE<br>LAS VEGAS, NV 89130 |            | LAS VEGAS, NV<br>2727 SOUTH RAINBOW BOULEVARD<br>LAS VEGAS, NEVADA 89146-5148<br>PH: (702) 373-7553 FAX: (702) 362-2597 WEB: WWW.VTNN.COM<br>CONSULTING ENGINEERS • PLANNERS • LAND SURVEYORS |            |
| DETAIL SHEET 3                                                        |            | CRYSTAL PARK APARTMENTS                                                                                                                                                                       |            |
| DRAWN BY:<br>KOH                                                      | 08/14/2017 | CHECKED BY:<br>WJM                                                                                                                                                                            | 08/14/2017 |
| DESIGNED BY:<br>DEL                                                   | 08/14/2017 | PROJECT NO:<br>7844                                                                                                                                                                           | SCALE: N/A |
| DRAWING NO.                                                           |            | SHEET<br>DT3<br>17 OF 23 SHEETS                                                                                                                                                               |            |
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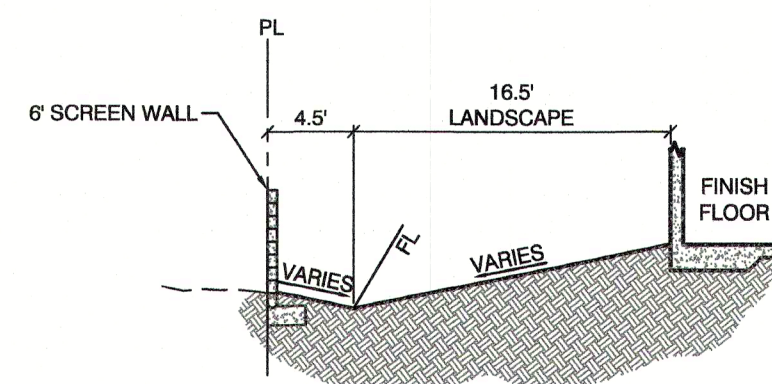




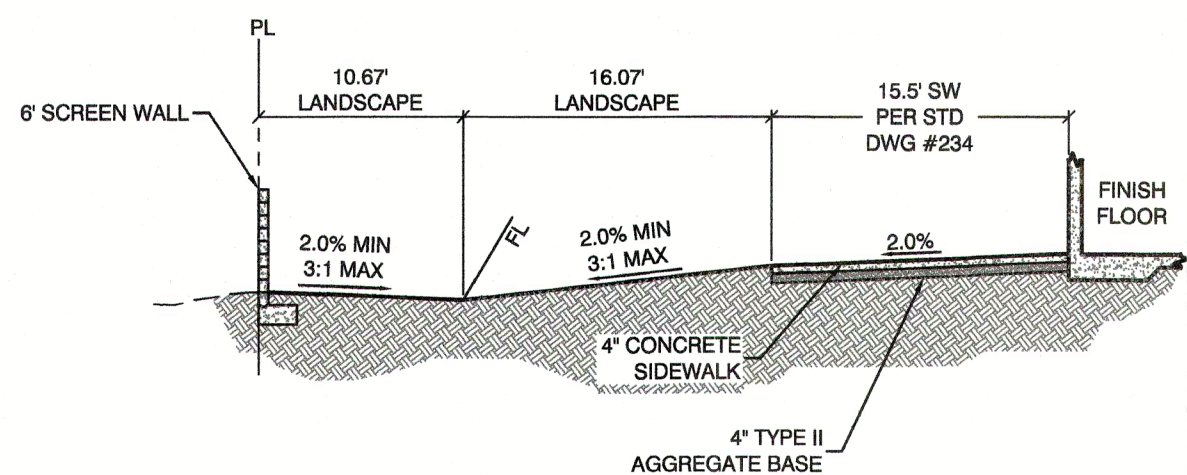
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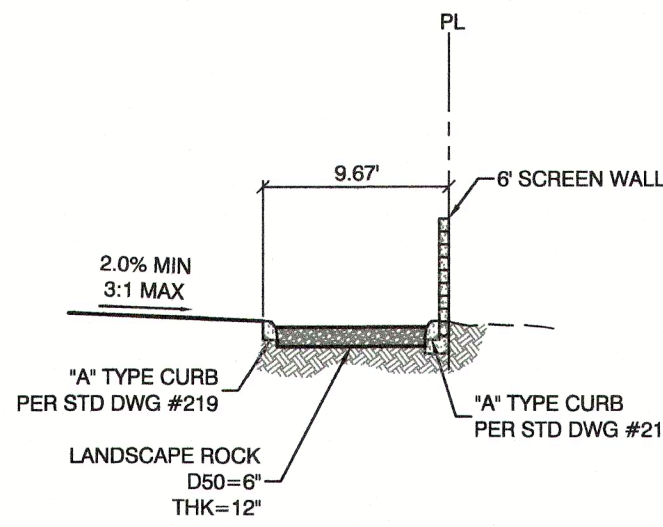
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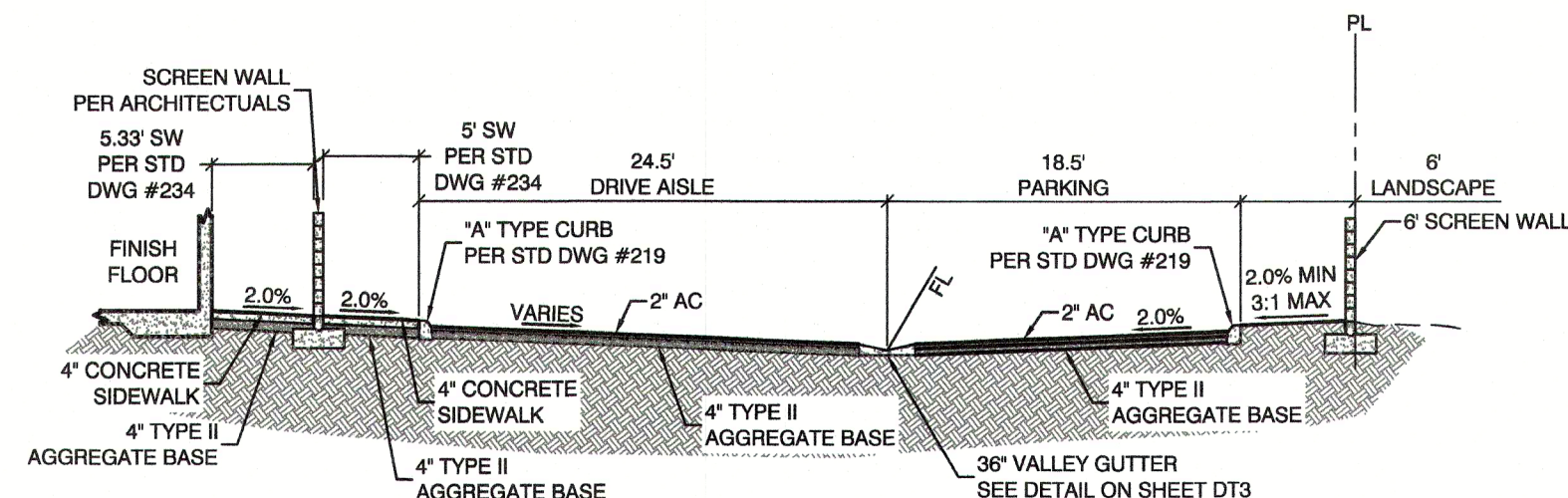
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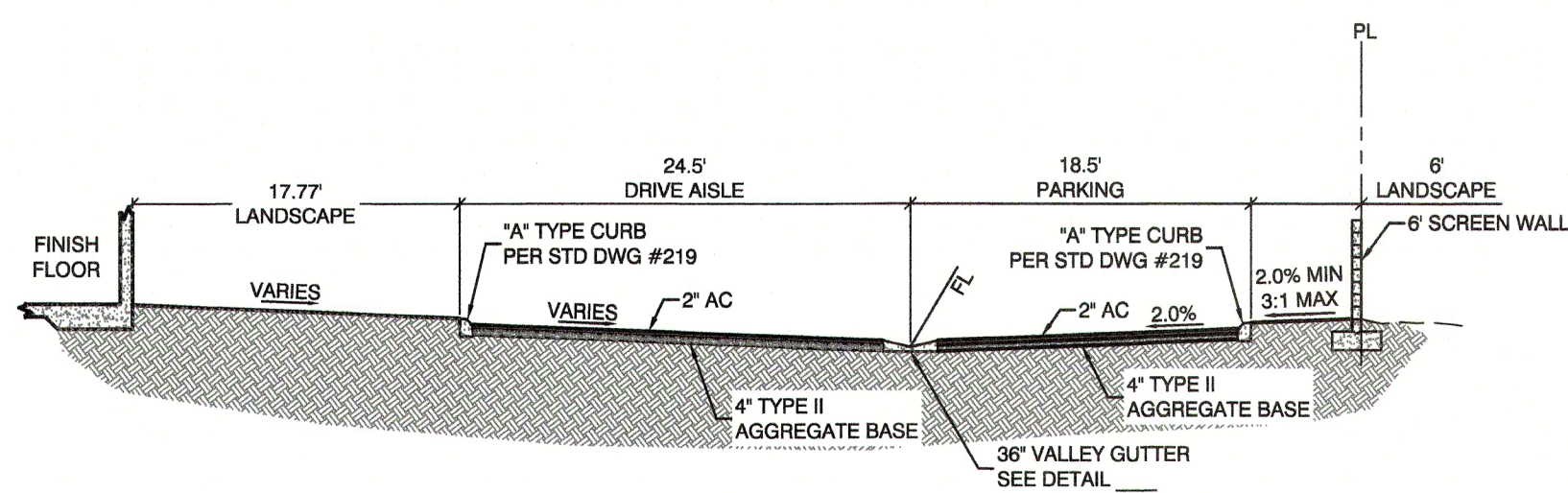
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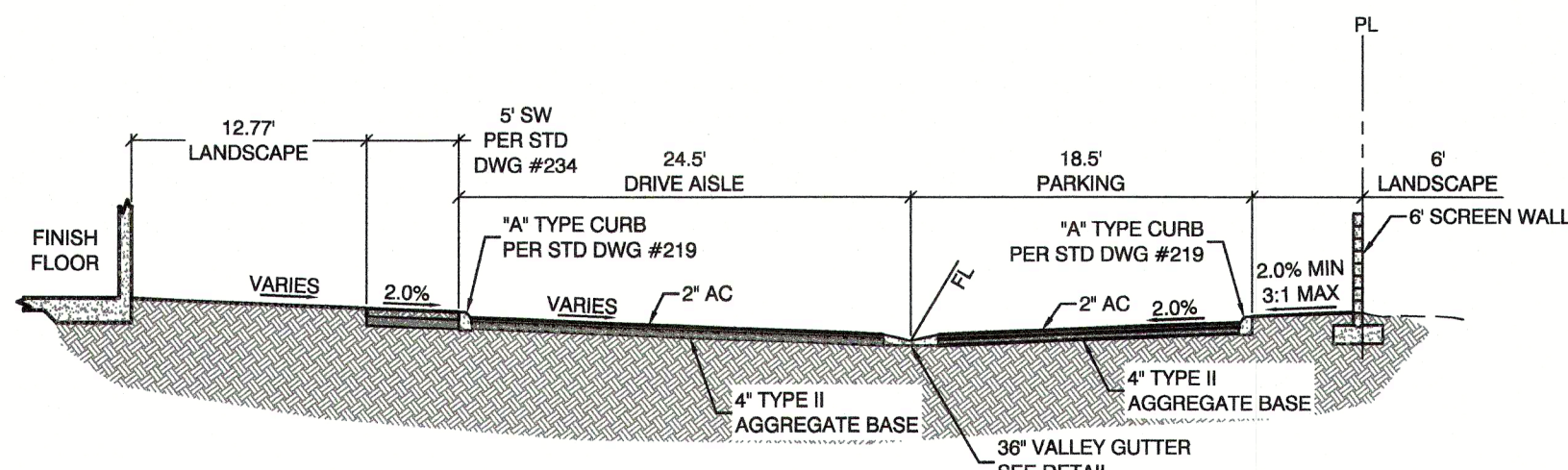
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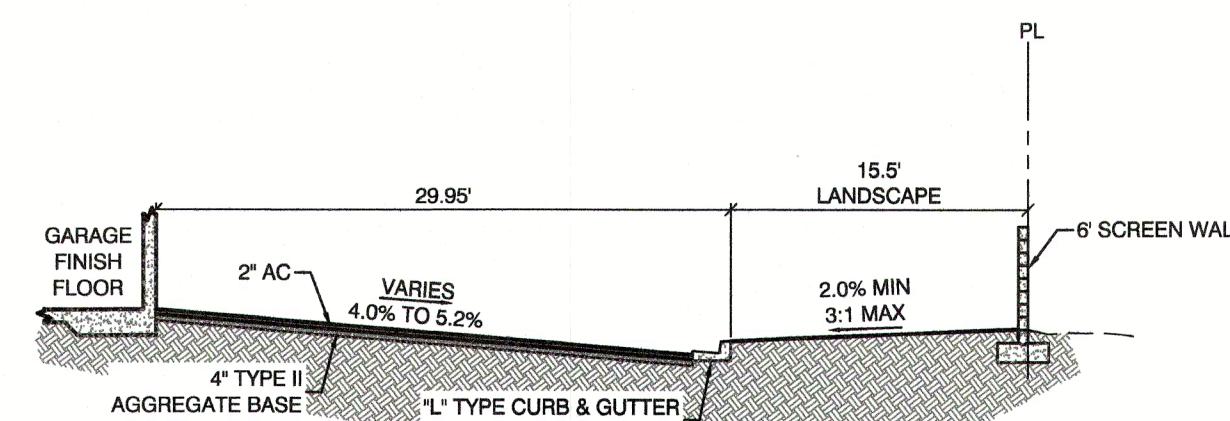
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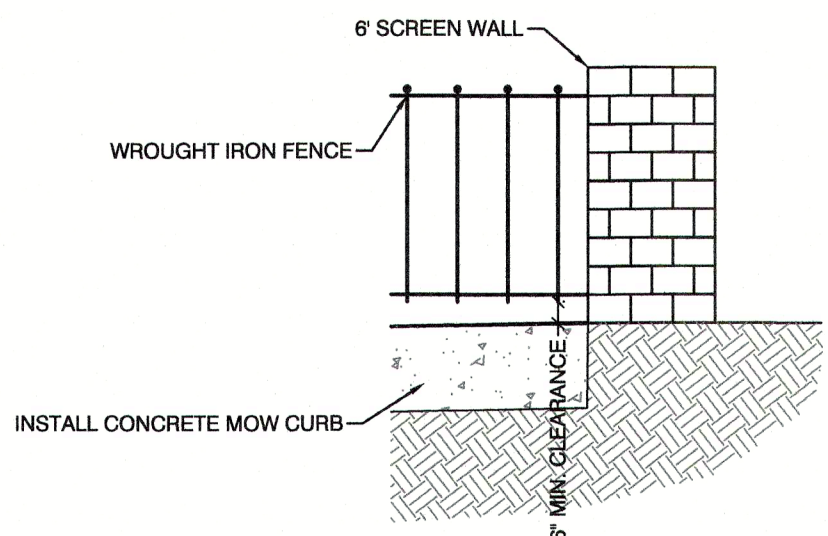
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TYPICAL SECTION  
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NTS

EAB INVESTMENT COMPANY  
3065 N. RANCHO #130  
LAS VEGAS, NV 89113

LAS VEGAS, NV  
2727 SOUTH RAINBOW BOULEVARD  
LAS VEGAS, NEVADA 89146-5146  
PH: (702) 873-7559 FAX: (702) 362-2597 WEB: WWW.VTNN.COM  
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REVISION  
DATE  
BY  
REV

DETAIL SHEET 2

CRYSTAL PARK APARTMENTS

DRAWN BY:  
KOH

DESIGNED BY:  
DEH

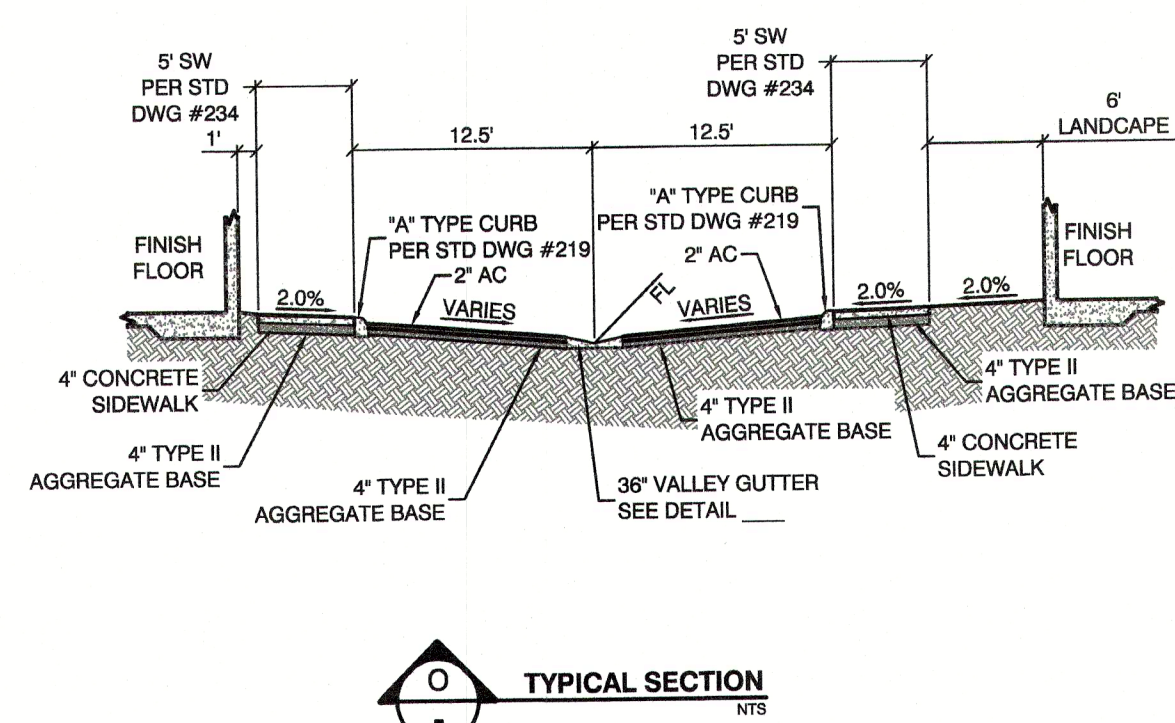
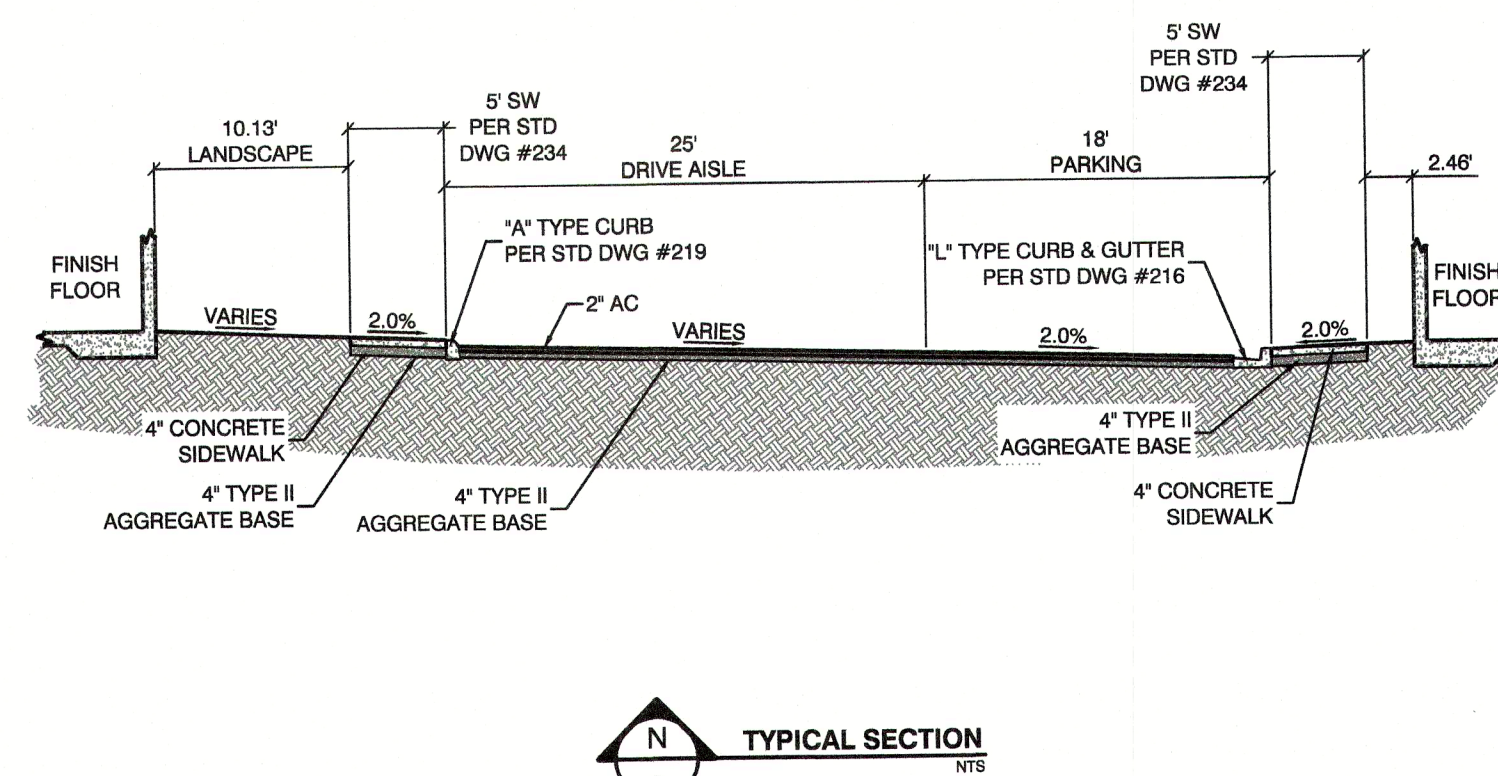
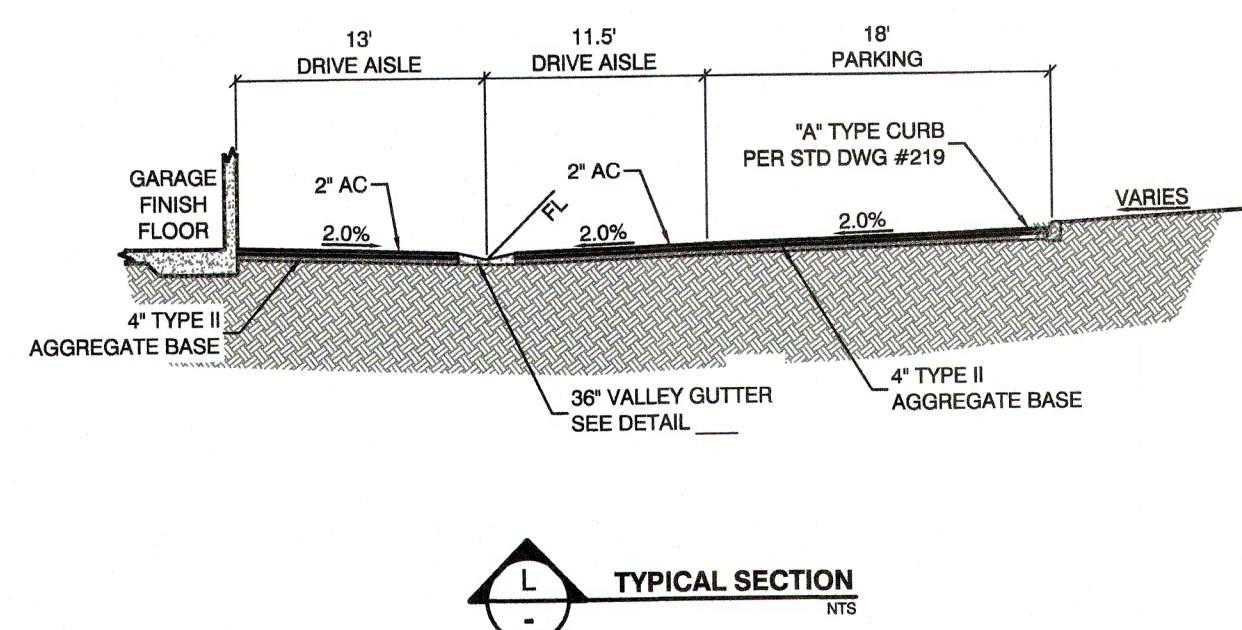
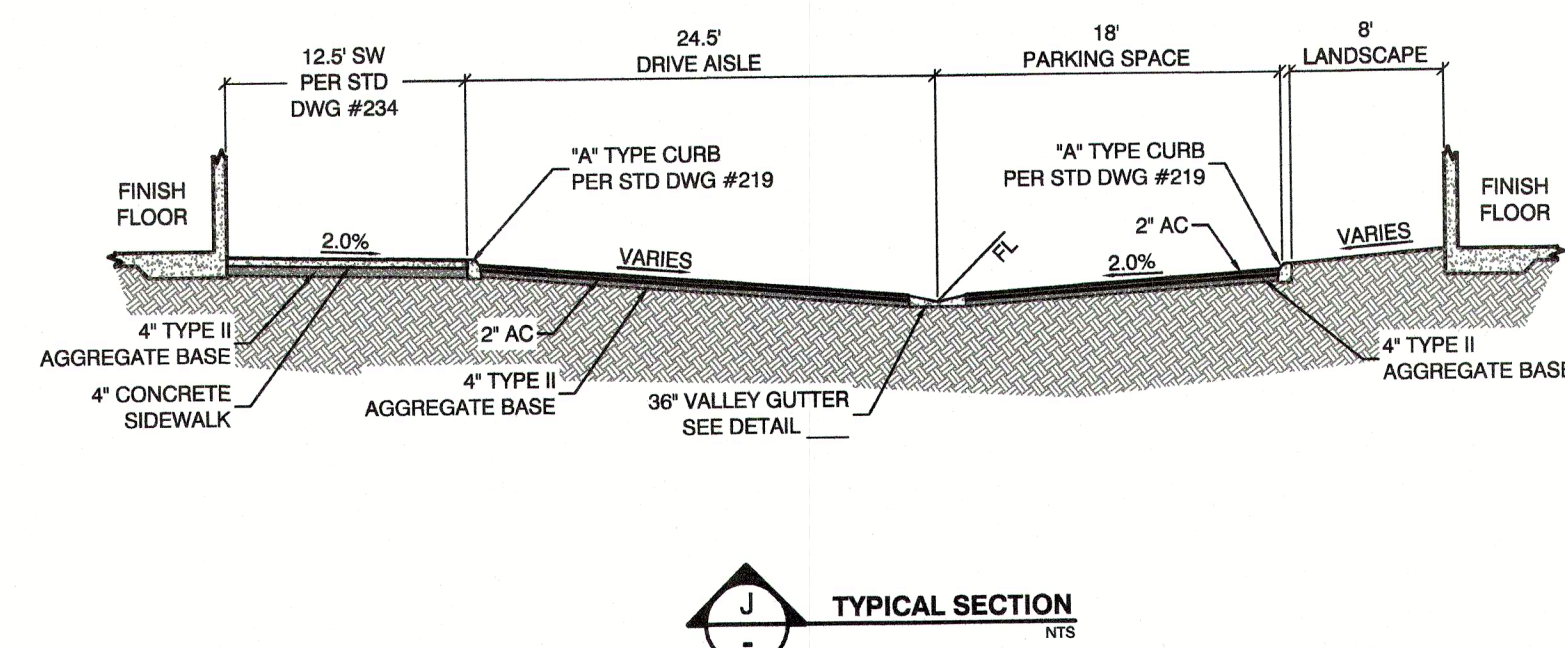
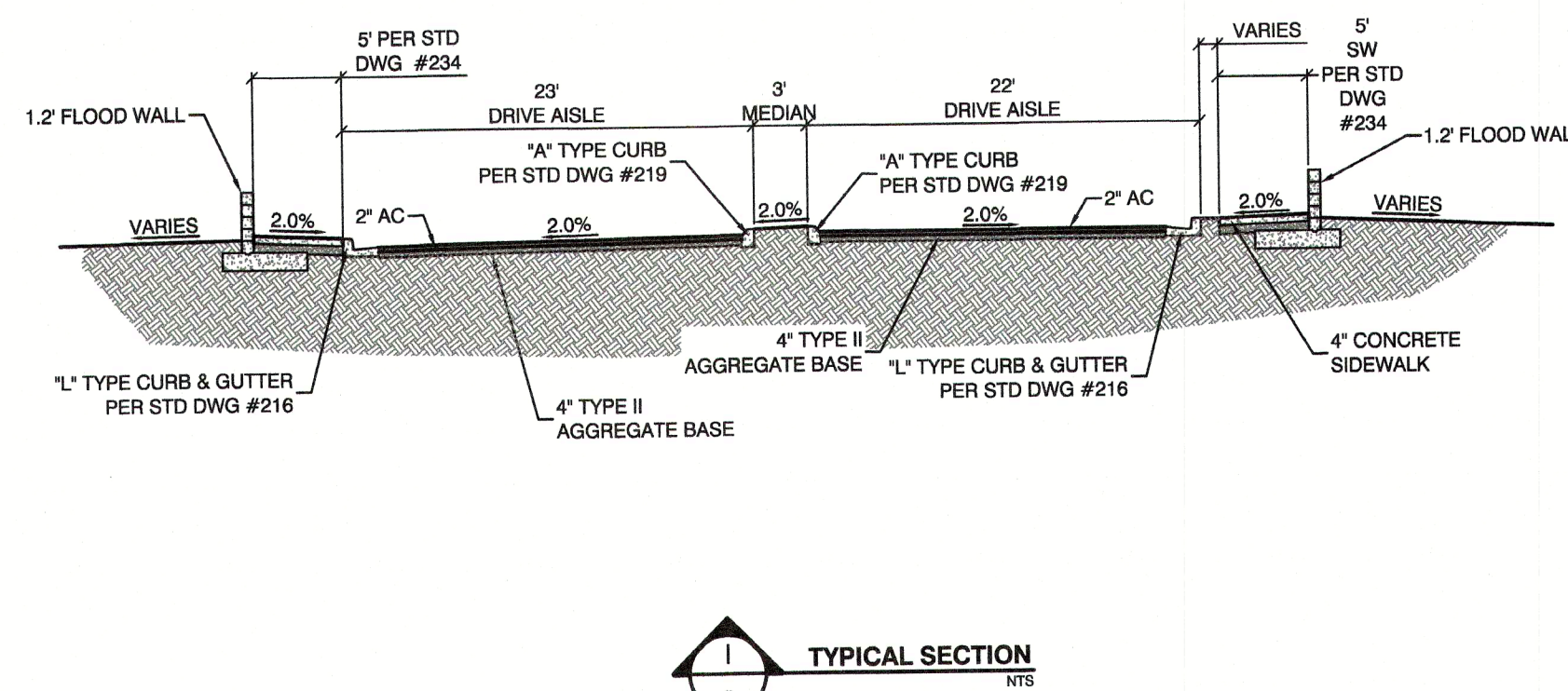
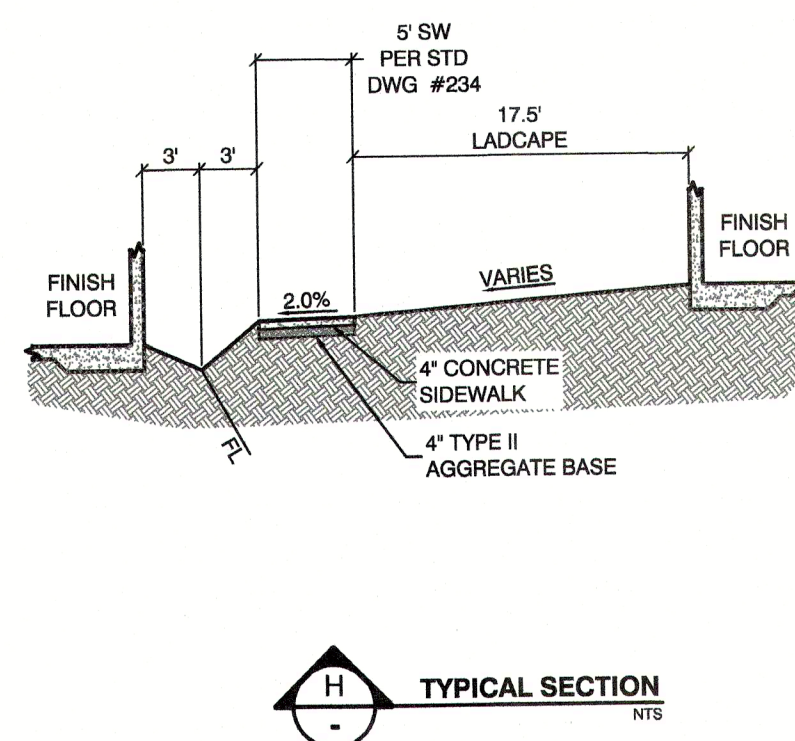
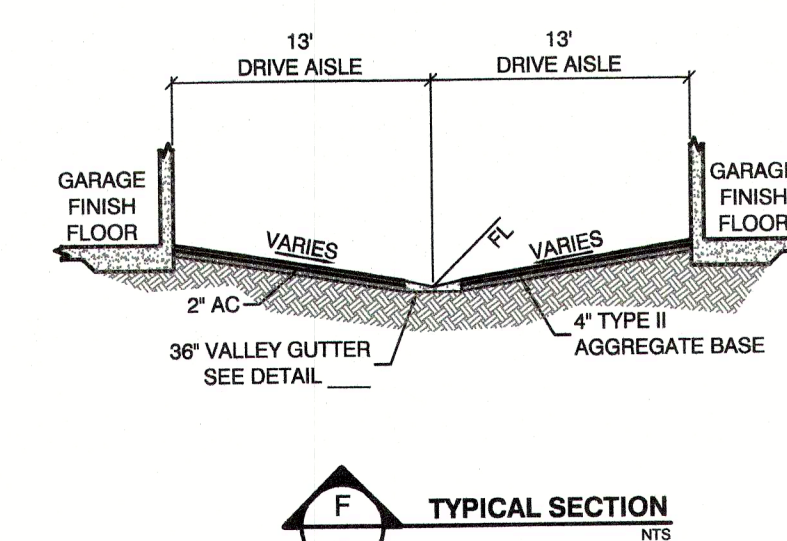
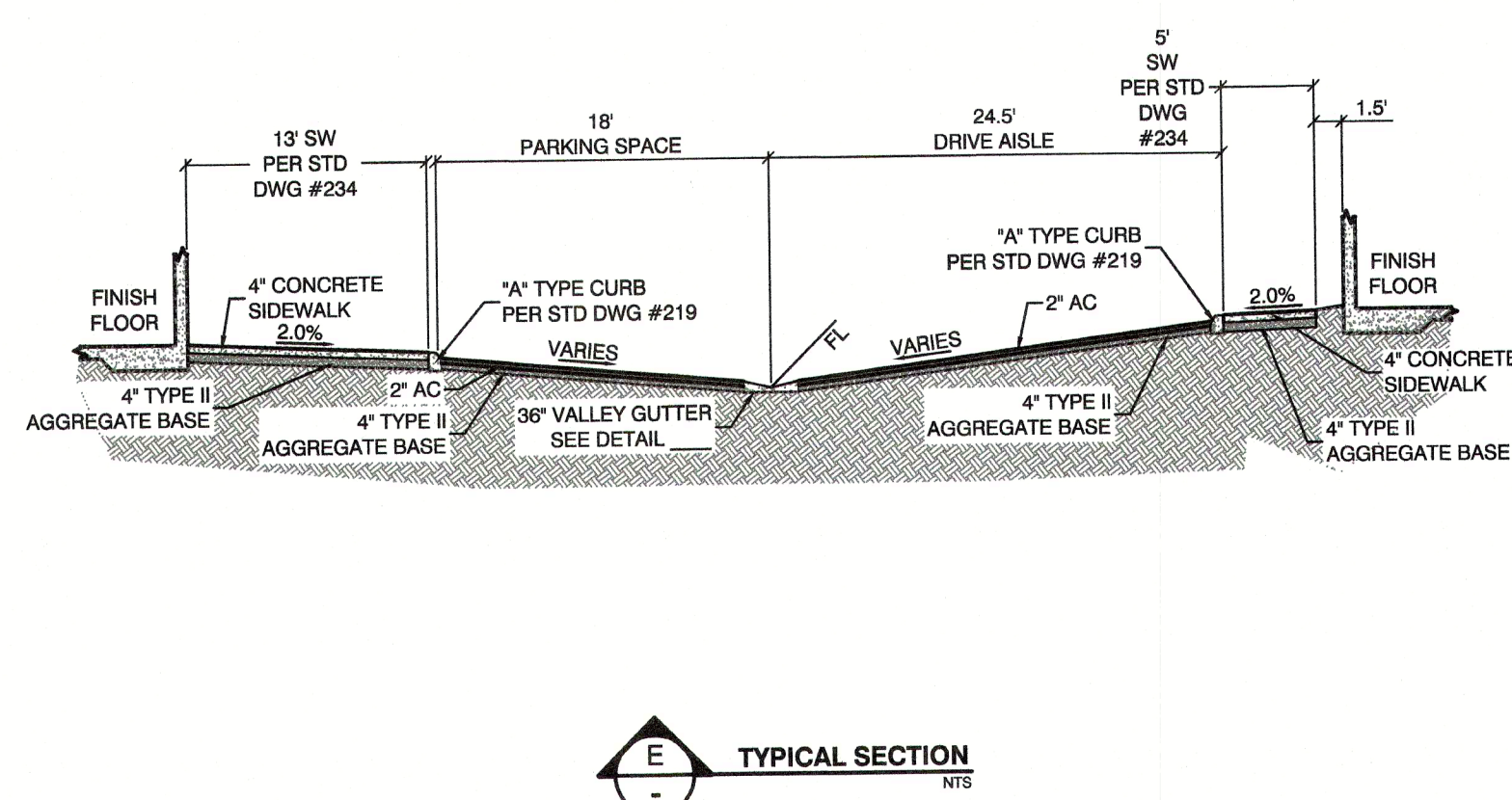
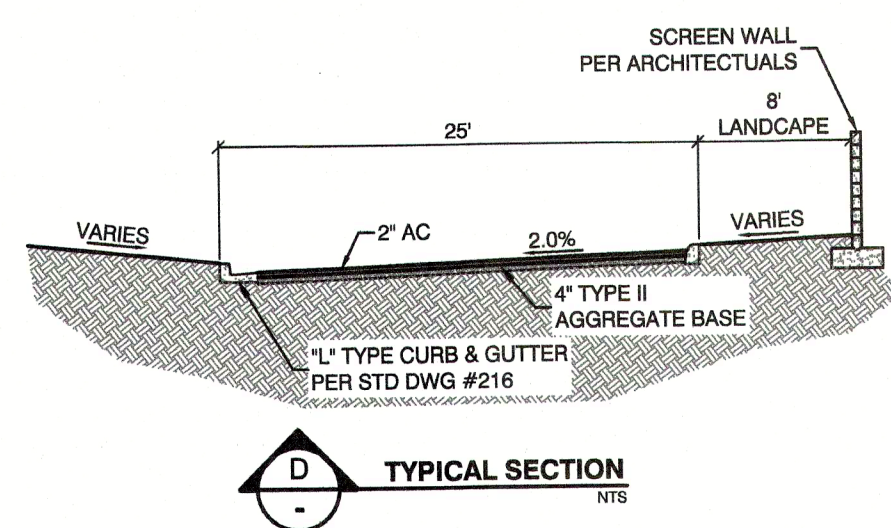
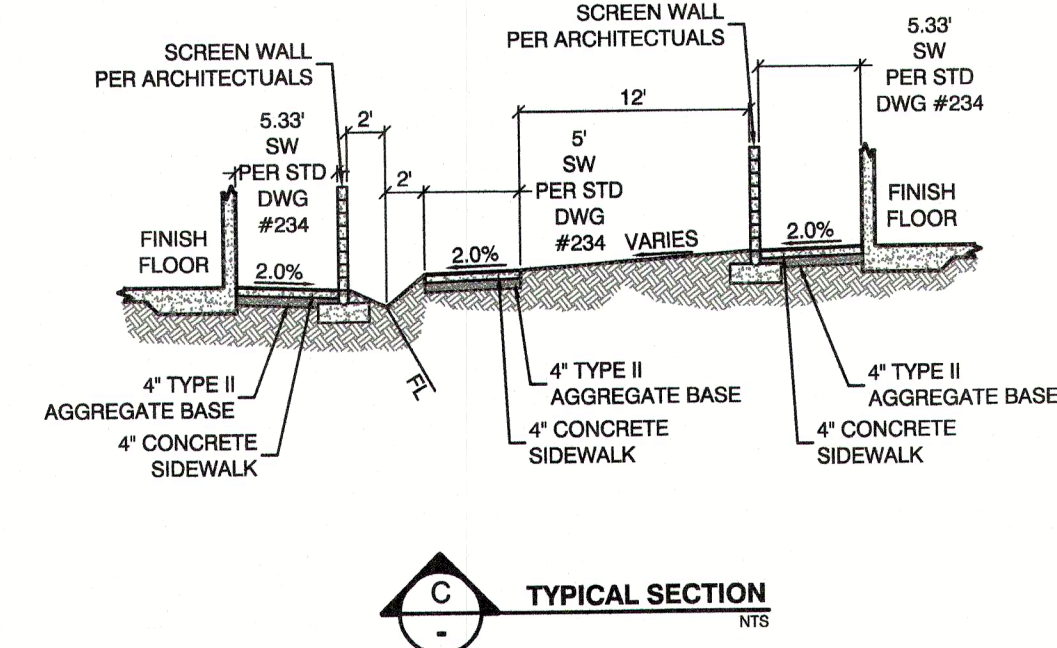
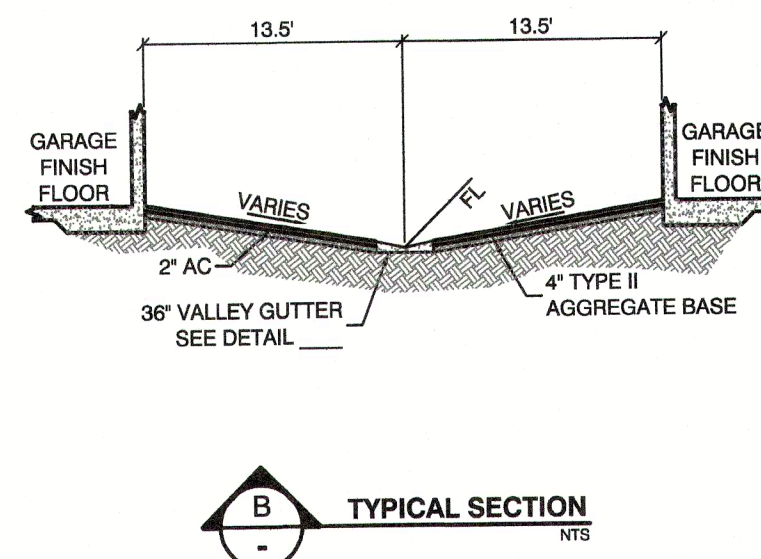
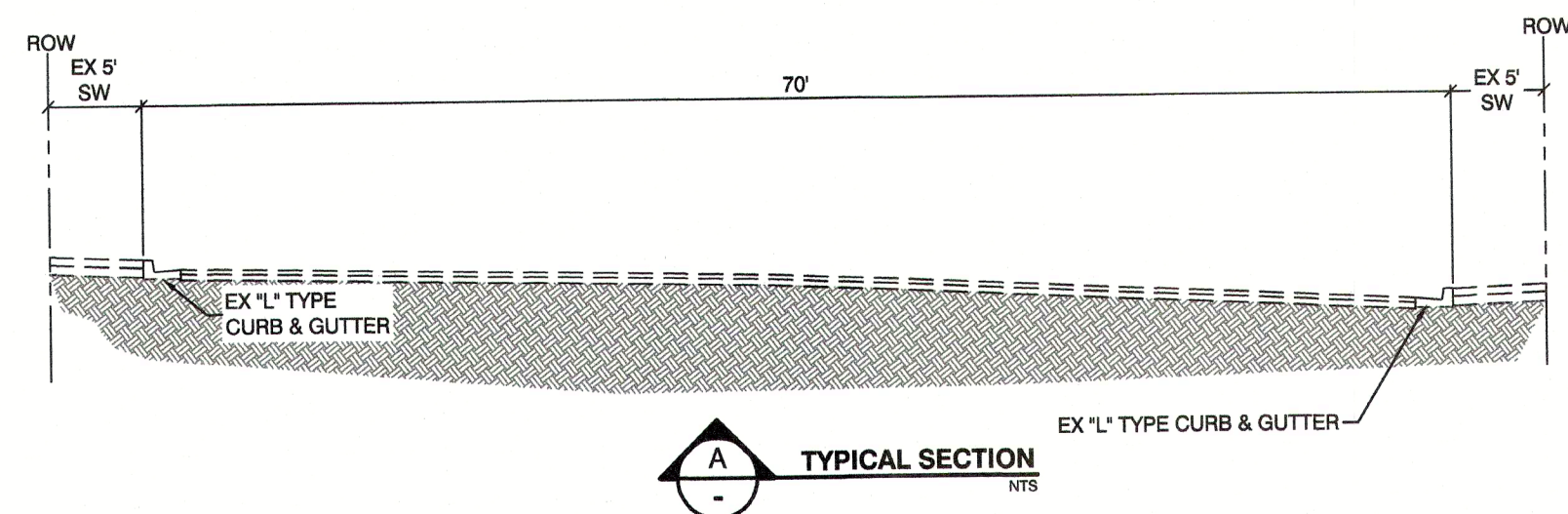
CHECKED BY:  
WJM

PROJECT NO:  
7844

PROFESSIONAL ENGINEER STATE OF NEVADA  
WILLIAM J. MEYER  
EXP. 12/31/19  
CIVIL  
No. 15745

SHEET  
DT2  
16 OF 23 SHEETS  
DRAWING NO.





EAB INVESTMENT COMPANY  
3885 N. RANCHO #130  
LAS VEGAS, NV 89113

DETAIL SHEET 1  
CRYSTAL PARK APARTMENTS

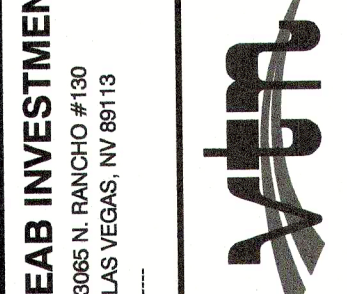
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DESIGNED BY: 08/14/2017  
CHECKED BY: 08/14/2017  
PROJECT NO: 15745  
SCALE: N/A  
HORIZ: N/A  
VERT: 7844

WILLIAM J. MEYER  
PROFESSIONAL ENGINEER  
CIVIL  
EXP: 12/31/19  
3/8/18

SHEET  
DT1  
15 OF 23 SHEETS  
DRAWING NO.

LAS VEGAS, NV

2727 SOUTH RAINBOW BOULEVARD  
LAS VEGAS, NEVADA 89146-5148  
PH: (702) 973-7550 FAX: (702) 962-2897  
WWW.VTNNV.COM  
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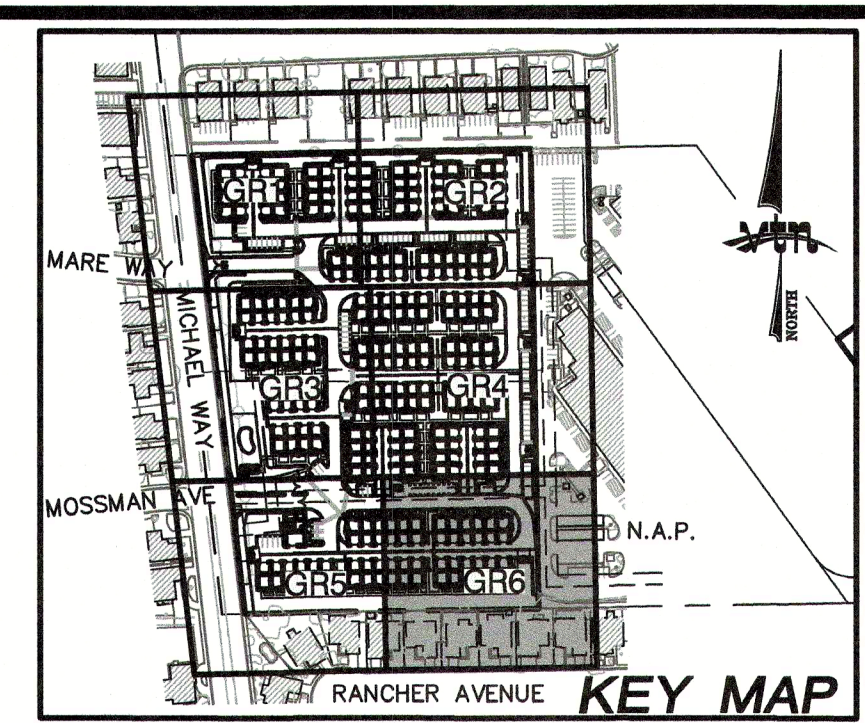
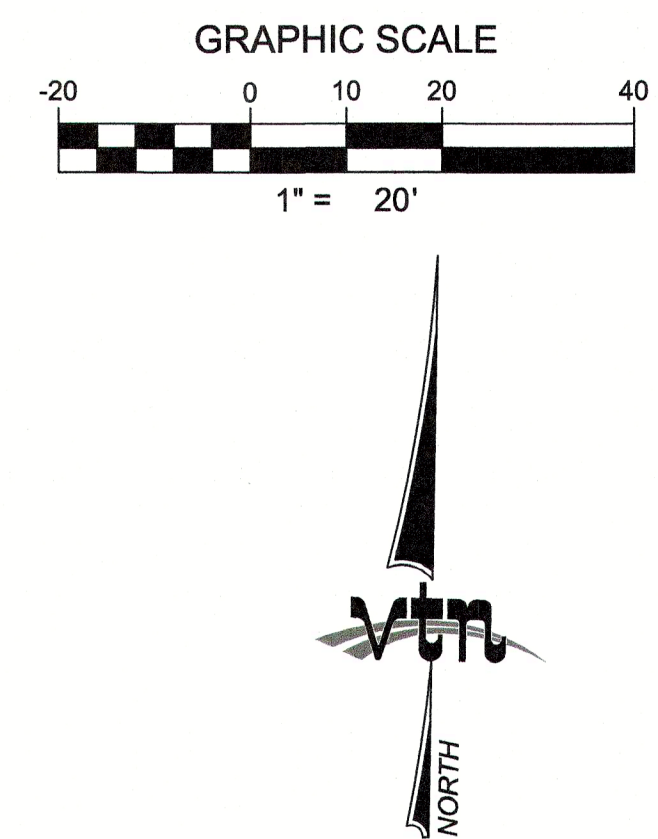
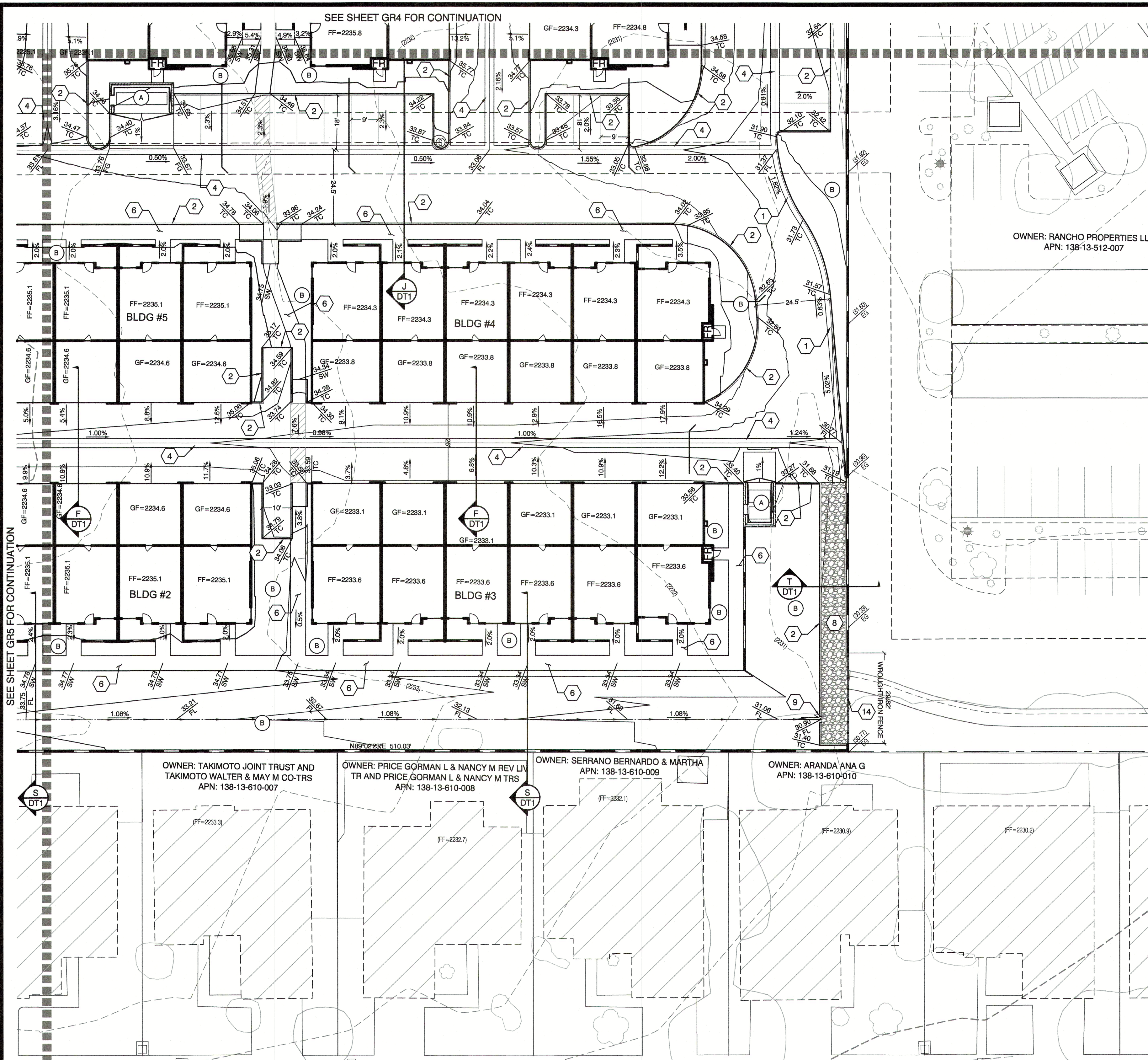
CRYSTAL PARK APARTMENTS

DRAWN BY: 08/14/2017  
DESIGNED BY: 08/14/2017  
CHECKED BY: 08/14/2017  
PROJECT NO: 15745  
SCALE: N/A  
HORIZ: N/A  
VERT: 7844

WILLIAM J. MEYER  
PROFESSIONAL ENGINEER  
CIVIL  
EXP: 12/31/19  
3/8/18

SHEET  
DT1  
15 OF 23 SHEETS  
DRAWING NO.





| LEGEND                   |          |          |        |
|--------------------------|----------|----------|--------|
| DESCRIPTION              | PROPOSED | EXISTING | FUTURE |
| CONTOUR (5' INTERVAL)    | 2450     | (2450)   | (2450) |
| CONTOUR (1' INTERVAL)    |          |          |        |
| EDGE OF PAVEMENT         |          |          |        |
| SAW CUT                  |          |          |        |
| RETAINING WALL           |          |          |        |
| SCREEN WALL              |          |          |        |
| RIGHT OF WAY             |          |          |        |
| CENTER LINE              |          |          |        |
| BACK OF CURB             |          |          |        |
| LIP OF GUTTER            |          |          |        |
| FACE OF CURB             |          |          |        |
| SIDEWALK                 |          |          |        |
| UNIT BOUNDARY LINE       |          |          |        |
| PROPERTY LINE            |          |          |        |
| SLOPE AND FLOW DIRECTION |          |          |        |
| SCARP AREA               |          |          |        |
| MATCHLINE                |          |          |        |
| SIDEWALK RAMP            |          |          |        |
| SIGHT VISIBILITY ZONES   |          |          |        |
| PAVED ROAD               |          |          |        |
| PAVEMENT REMOVAL         |          |          |        |
| RIP RAP                  |          |          |        |
| LANDSCAPE ROCK           |          |          |        |

- CONSTRUCTION NOTES
- CONSTRUCT 24" TYPE "L" CURB & GUTTER PER CCAUSD #216.
  - CONSTRUCT TYPE "A" CURB PER CCAUSD #219.
  - 0" CURB FACE PER DETAIL ON SHEET DT3
  - CONSTRUCT 3" VALLEY GUTTER PER THE DETAIL ON SHEET DT3
  - CONSTRUCT 8" VALLEY GUTTER PER CCAUSD # 228
  - CONSTRUCT 5" SIDEWALK PER CCAUSD # 234
  - INSTALL PRECAST BUMPER BLOCK PER CCAUSD #238.
  - INSTALL LANDSCAPE ROCK D50=6" 12" THK
  - CONSTRUCT 2' CURB CUT PER DETAIL ON SHEET DT3
  - CONSTRUCT SIDE WALK UNDER DRAIN PER CCAUSD #236.
  - CONSTRUCT "U" CHANNEL PER DETAIL ON SHEET DT3
  - CONSTRUCT COMMERCIAL DRIVEWAY PER CCAUSD #225
  - CONSTRUCT 6" PVC STORM DRAIN
  - INSTALL WROUGHT IRON FENCE WITH A 6" CLEAR SPACE @ THE BOTTOM FOR UNOBSTRUCTED STORM RUNOFF FLOW. SEE DETAIL "Y" ON SHEET DT2.
  - HANDICAP ACCESS TO THE RIGHT OF WAY
  - REMOVE EXISTING PAVEMENT

- COORDINATION ITEMS
- SEE ARCHITECTURAL DRAWINGS FOR TRASH ENCLOSURE PLAN AND DETAILS. MAXIMUM 1% SLOPE ON TRASH ENCLOSURE SLAB.
  - SEE ARCHITECTURAL AND LANDSCAPE PLANS FOR DETAILS OF OPEN SPACE AREAS.

ENGINEER DISCLAIMER NOTE:

UTILITY LOCATIONS SHOWN HERE ON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT HORIZONTAL AND VERTICAL LOCATION OF ALL EXISTING UNDERGROUND AND OVERHEAD UTILITIES AND NOTIFY THE DESIGN ENGINEER IMMEDIATELY OF ANY DISCREPANCIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HERE ON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

I CERTIFY THAT THIS GRADING PLAN CONFORMS TO THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE WITH LAS VEGAS, NV, #----

15745, P.E. No. WILLIAM J. MEYER DATE 3/8/18

**BENCHMARK**

PROJECT DATUM: NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)

CITY OF LAS VEGAS BENCHMARK: 2LV0013N6 (REVISED 2008)

NAVD88 ELEVATION: 679.739 METERS (2230.11 FEET)

FOUND RIVET AND PLATE IN THE TOP OF CURB ON THE WEST SIDE OF RANCHO AT 3101 RANCHO

**BASIS OF BEARING**

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS ZONE, NORTH AMERICAN DATUM OF 1983, SAID MERIDIAN BEING COINCIDENT WITH 114°56' WEST OF THE GREENWICH MERIDIAN.

LINEAR UNIT: US SURVEY FOOT (FTUS)

DATUM (REFERENCE FRAME): NAD 83 (2011) EPOCH 2010.00

SYSTEM: NEVADA COORDINATE REFERENCE SYSTEM (NCRS)

ZONE: LAS VEGAS

PROJECTION: TRANSVERSE MERCATOR

STANDARD PARALLEL (AND LATITUDE OF GRID ORIGIN): 36°15'00"N

LONGITUDE OF CENTRAL MERIDIAN: 114°56'00"W

NORTHING AT GRID ORIGIN: 200,000,000 M (656,166,667 FTUS)

EASTING AT CENTRAL MERIDIAN: 100,000,000 M (328,083,333 FTUS)

SCALE FACTOR ON CENTRAL MERIDIAN: 1.0001 (EXACT)

Call before you Dig

1-702-455-7511

1-702-227-2929

CLARK COUNTY TRAFFIC OPERATIONS

Call before you Dig

1-702-227-2929

CLARK COUNTY TRAFFIC OPERATIONS

**SIGHT VISIBILITY ZONES:**

NO STRUCTURE, WALLS, VEGETATION, OR OBJECT OF ANY KIND IS PERMITTED OVER TWENTY-FOUR (24) INCHES IN HEIGHT (MEASURED FROM THE TOP OF ADJACENT CURB IF CURB EXISTS) WITHIN THE SIGHT VISIBILITY ZONES.

**EARTHWORK QUANTITIES**

| CUT         | FILL        | NET                |
|-------------|-------------|--------------------|
| 8,336       | 19,754      | 11,418             |
| CUBIC YARDS | CUBIC YARDS | CUBIC YARDS (FILL) |

**GRADING PERMIT NOTE**

THIS GRADING PERMIT DOES NOT INCLUDE THE CONSTRUCTION OF RETAINING WALLS AND OTHERS STRUCTURES. SEPARATE PERMITS AND APPLICATIONS ARE REQUIRED FOR THESE.

**GEOTECHNICAL NOTE:**

REFER TO SOILS REPORT: ----

PROJECT # ----, DATED ----

HTE # ----

**SIDEWALK RAMPS TABLE**

(PER CCAUSD No. 235, CASE I)

| NO. | DIM "A" | DIM "B" | CASE |
|-----|---------|---------|------|
| 1   | 4.5'    | 12'     | I    |
| 2   | 4.5'    | 9.5'    | I    |
| 3   | 8'      | 8'      | I    |
| 4   | 9.5'    | 4.5'    | I    |
| 5   | 12'     | 4.5'    | I    |

EAB INVESTMENT COMPANY

2777 SOUTH RAINBOW BOULEVARD

LAS VEGAS, NEVADA 89146-5148

PH: (702) 973-7500 FAX: (702) 962-2897 WEB: WWW.VTNN.COM

CONSULTING ENGINEERS & PLANNERS • LAND SURVEYORS

GRADING PLAN 6

CRYSTAL PARK APARTMENTS

DRAWN BY: KGH

DESIGNED BY: DBH

CHECKED BY: WJM

PROJECT NO: 7844

DATE: 08/14/2017

SCALE: 1"=20'

HORIZ. VERT. N/A

PROFESSIONAL ENGINEER - STATE OF NEVADA

WILLIAM J. MEYER

EXP: 12/31/19

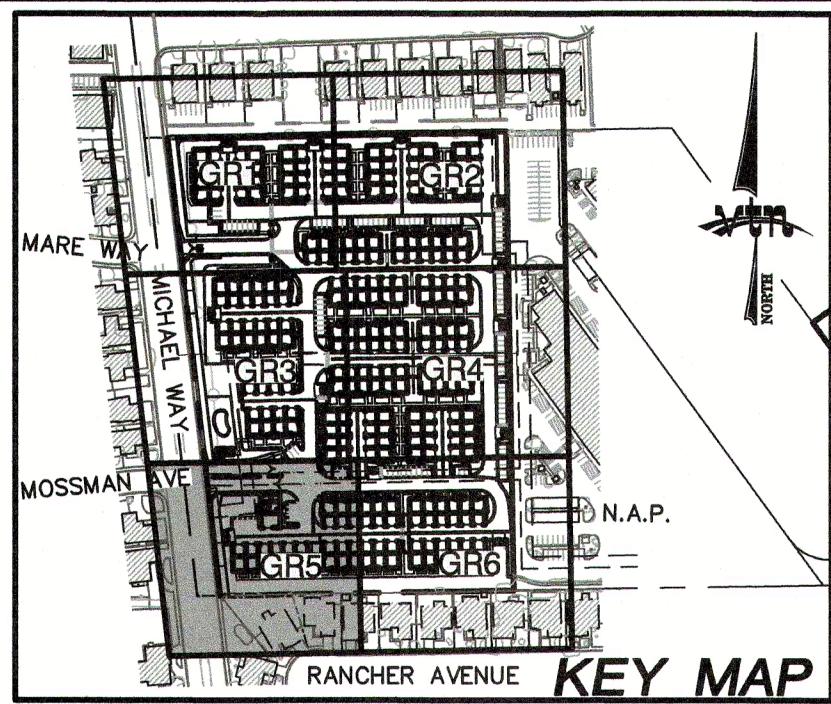
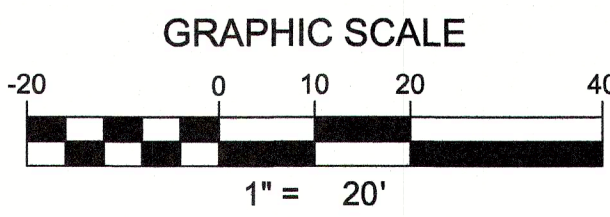
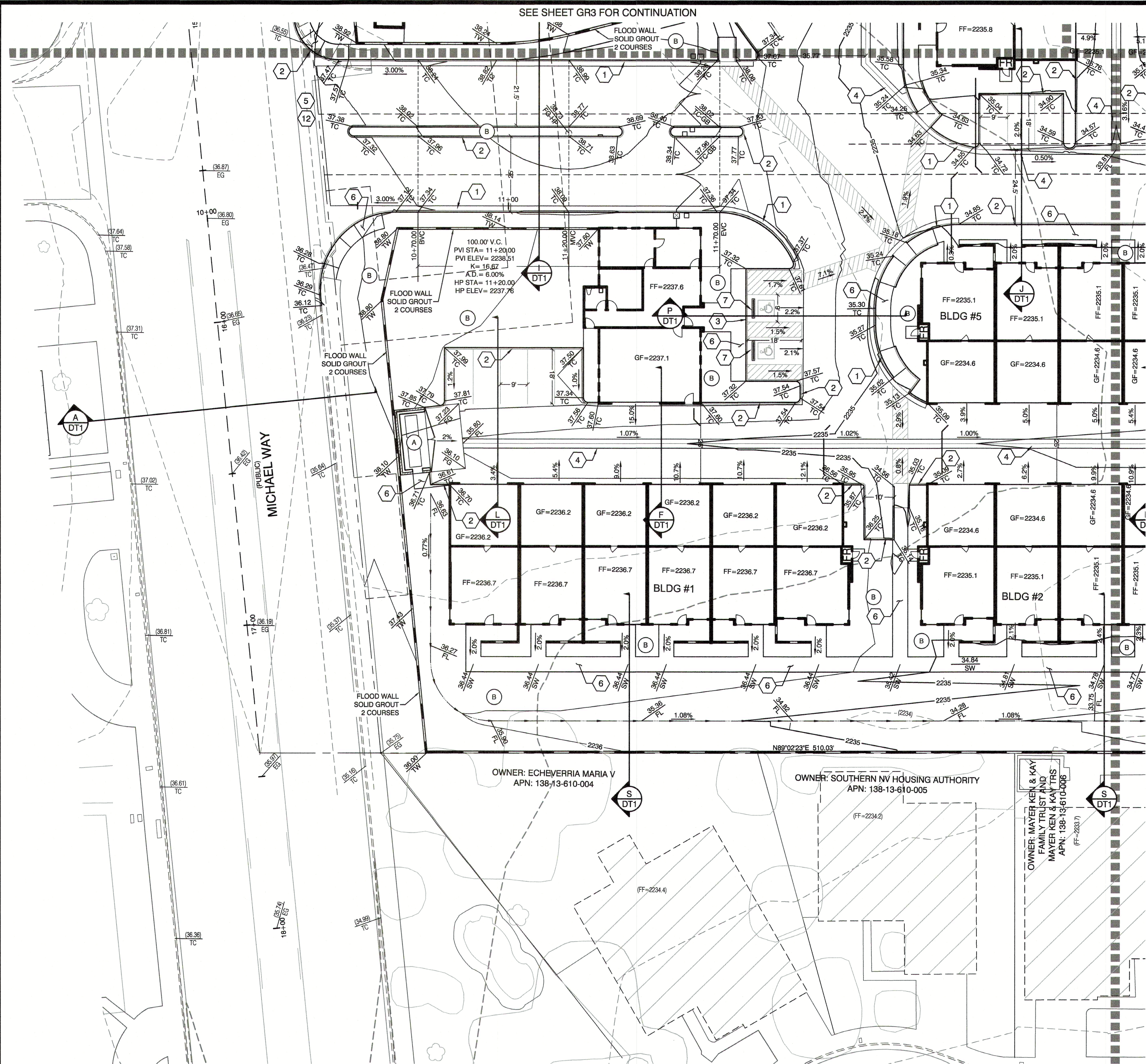
CIVIL

3/8/18

14 OF 23 SHEETS

DRIVING NO.





| LEGEND                   |          |          |        |
|--------------------------|----------|----------|--------|
| DESCRIPTION              | PROPOSED | EXISTING | FUTURE |
| CONTOUR (5' INTERVAL)    | 2450     | (2450)   | (2450) |
| CONTOUR (1' INTERVAL)    |          |          |        |
| EDGE OF PAVEMENT         |          |          |        |
| SAW CUT                  |          |          |        |
| RETAINING WALL           |          |          |        |
| SCREEN WALL              |          |          |        |
| RIGHT OF WAY             |          |          |        |
| CENTER LINE              |          |          |        |
| BACK OF CURB             |          |          |        |
| LIP OF GUTTER            |          |          |        |
| FACE OF CURB             |          |          |        |
| SIDEWALK                 |          |          |        |
| UNIT BOUNDARY LINE       |          |          |        |
| PROPERTY LINE            |          |          |        |
| SLOPE AND FLOW DIRECTION |          |          |        |
| SCARP AREA               |          |          |        |
| MATCHLINE                |          |          |        |
| SIDEWALK RAMP            |          |          |        |
| SIGHT VISIBILITY ZONES   |          |          |        |
| PAVED ROAD               |          |          |        |
| PAVEMENT REMOVAL         |          |          |        |
| RIP RAP                  |          |          |        |
| LANDSCAPE ROCK           |          |          |        |

#### CONSTRUCTION NOTES

- CONSTRUCT 24" TYPE "L" CURB & GUTTER PER CCAUSD #216.
- CONSTRUCT TYPE "A" CURB PER CCAUSD #219.
- 0" CURB FACE PER DETAIL ON SHEET DT3
- CONSTRUCT 3" VALLEY GUTTER PER THE DETAIL ON SHEET DT3
- CONSTRUCT 8" VALLEY GUTTER PER CCAUSD # 228
- CONSTRUCT 5" SIDEWALK PER CCAUSD # 234
- INSTALL PRECAST BUMPER BLOCK PER CCAUSD #238.
- INSTALL LANDSCAPE ROCK D50=6" 12" THK
- CONSTRUCT 2" CURB CUT PER DETAIL ON SHEET DT3
- CONSTRUCT SIDE WALK UNDER DRAIN PER CCAUSD #236.
- CONSTRUCT "U" CHANNEL PER DETAIL ON SHEET DT3
- CONSTRUCT COMMERCIAL DRIVEWAY PER CCAUSD #225
- CONSTRUCT 6" PVC STORM DRAIN
- INSTALL WROUGHT IRON FENCE WITH A 6" CLEAR SPACE @ THE BOTTOM FOR UNOBSTRUCTED STORM RUNOFF FLOW. SEE DETAIL "Y" ON SHEET DT2.
- HANDICAP ACCESS TO THE RIGHT OF WAY
- REMOVE EXISTING PAVEMENT

#### COORDINATION ITEMS

- SEE ARCHITECTURAL DRAWINGS FOR TRASH ENCLOSURE PLAN AND DETAILS. MAXIMUM 1% SLOPE ON TRASH ENCLOSURE SLAB.
- SEE ARCHITECTURAL AND LANDSCAPE PLANS FOR DETAILS OF OPEN SPACE AREAS.

#### ENGINEER DISCLAIMER NOTE:

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I CERTIFY THAT THIS GRADING PLAN CONFORMS TO THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE WITH LAS VEGAS, NV. DATE 3/8/10

**BENCHMARK**

PROJECT DATUM: NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)

CITY OF LAS VEGAS BENCHMARK: 2LV0013N68 (REVISED 2008)

NAVD88 ELEVATION: 679.739 METERS (2230.11 FEET)

FOUND RIVET AND PLATE IN THE TOP OF CURB ON THE WEST SIDE OF RANCHO AT 3101 RANCHO

**BASIS OF BEARING**

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS ZONE, NORTH AMERICAN DATUM OF 1983, SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

LINEAR UNIT: US SURVEY FOOT (FT/US)

DATUM (REFERENCE FRAME): NAD 83 (2011) EPOCH 2010.00

SYSTEM: NEVADA COORDINATE REFERENCE SYSTEM (NCRS)

ZONE: LAS VEGAS

PROJECTION: TRANSVERSE MERCATOR

STANDARD PARALLEL (AND LATITUDE OF GRID ORIGIN): 36°15'00"N

LONGITUDE OF CENTRAL MERIDIAN: 114°58'00"W

NORTHING AT GRID ORIGIN: 200,000,000 M (656,166,667 FT/US)

EASTING AT CENTRAL MERIDIAN: 100,000,000 M (328,083,333 FT/US)

SCALE FACTOR ON CENTRAL MERIDIAN: 1.0001 (EXACT)

**Call before you Dig**

1-702-455-7511

CLARK COUNTY TRAFFIC OPERATIONS

1-702-229-9811

Call before you Dig

Avoid cutting underground utility lines. It's costly.

811

OR

1-800-227-2600

AND

1-702-455-6000

CLARK COUNTY TRAFFIC OPERATIONS

**Call before you Dig**

1-702-227-2929

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY.

**SIGHT VISIBILITY ZONES:**

NO STRUCTURE, WALLS, VEGETATION, OR OBJECT OF ANY KIND IS PERMITTED OVER TWENTY-FOUR (24) INCHES IN HEIGHT (MEASURED FROM THE TOP OF ADJACENT CURB IF CURB EXISTS) WITHIN THE SIGHT VISIBILITY ZONES.

**EARTHWORK QUANTITIES**

| CUT               | FILL               | NET                       |
|-------------------|--------------------|---------------------------|
| 8,336 CUBIC YARDS | 19,754 CUBIC YARDS | 11,418 CUBIC YARDS (FILL) |

**GRADING PERMIT NOTE**

THIS GRADING PERMIT DOES NOT INCLUDE THE CONSTRUCTION OF RETAINING WALLS AND OTHERS STRUCTURES. SEPARATE PERMITS AND APPLICATIONS ARE REQUIRED FOR THESE.

**GEOTECHNICAL NOTE:**

REFER TO SOILS REPORT: ---

PROJECT #---, DATED ---

HTE #---

| SIDEWALK RAMPS TABLE         |         |         |      |
|------------------------------|---------|---------|------|
| (PER CCAUSD No. 235, CASE I) |         |         |      |
| NO.                          | DIM "A" | DIM "B" | CASE |
| 1                            | 4.5'    | 12'     | I    |
| 2                            | 4.5'    | 9.5'    | I    |
| 3                            | 8'      | 8'      | I    |
| 4                            | 9.5'    | 4.5'    | I    |
| 5                            | 12'     | 4.5'    | I    |

**EAB INVESTMENT COMPANY**

**LAS VEGAS, NV**

3065 N. RANCHO #30  
LAS VEGAS, NV 89113

2727 SOUTH RAINBOW BOULEVARD  
LAS VEGAS, NEVADA 89146-5148  
PH: (702) 873-7599 FAX: (702) 362-2397 WEB: WWW.VTNNV.COM  
CONSULTING ENGINEERS • PLANNERS • LAND SURVEYORS

**GRADING PLAN 5**

**CRYSTAL PARK APARTMENTS**

DRAWN BY: KOH 08/14/2017

DESIGNED BY: DEH 08/14/2017

CHECKED BY: WJM 08/14/2017

PROJECT NO: 7844

SCALE: 1"=20'

HORIZ. VERT.

**WILLIAM J. MEYER**

PROFESSIONAL ENGINEER STATE OF NEVADA

EXP: 12/31/19

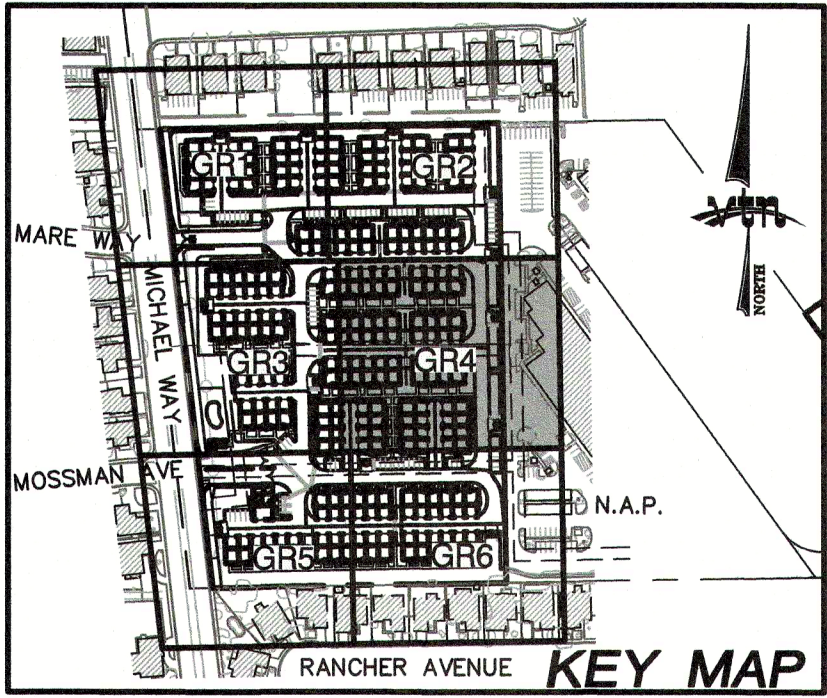
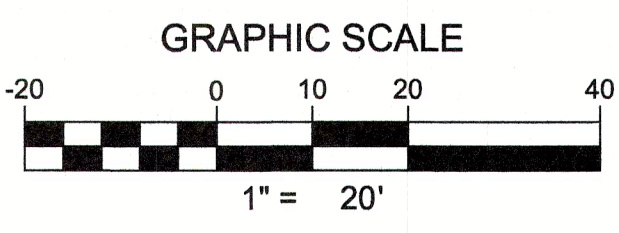
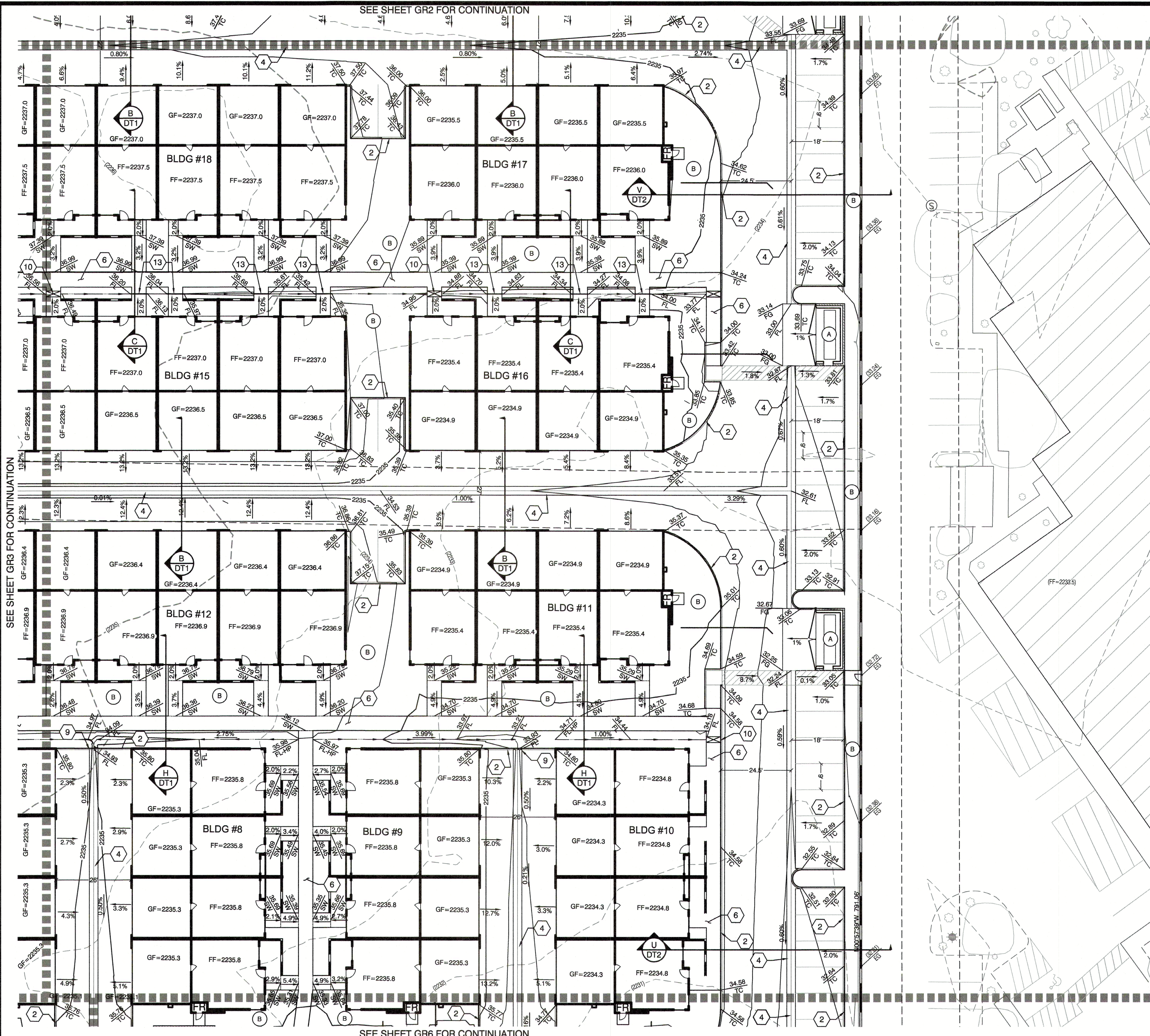
CIVIL

3/8/10

13 OF 23 SHEETS

DRAWING NO.





| LEGEND                   |          |          |        |
|--------------------------|----------|----------|--------|
| DESCRIPTION              | PROPOSED | EXISTING | FUTURE |
| CONTOUR (5' INTERVAL)    | 2450     | (2450)   | (2450) |
| CONTOUR (1' INTERVAL)    |          |          |        |
| EDGE OF PAVEMENT         |          |          |        |
| SAW CUT                  |          |          |        |
| RETAINING WALL           |          |          |        |
| SCREEN WALL              |          |          |        |
| RIGHT OF WAY             |          |          |        |
| CENTER LINE              |          |          |        |
| BACK OF CURB             |          |          |        |
| LIP OF GUTTER            |          |          |        |
| FACE OF CURB             |          |          |        |
| SIDEWALK                 |          |          |        |
| UNIT BOUNDARY LINE       |          |          |        |
| PROPERTY LINE            |          |          |        |
| SLOPE AND FLOW DIRECTION |          |          |        |
| SCARP AREA               |          |          |        |
| MATCHLINE                |          |          |        |
| SIDEWALK RAMP            |          |          |        |
| SIGHT VISIBILITY ZONES   |          |          |        |
| PAVED ROAD               |          |          |        |
| PAVEMENT REMOVAL         |          |          |        |
| RIP RAP                  |          |          |        |
| LANDSCAPE ROCK           |          |          |        |

- CONSTRUCTION NOTES**
- CONSTRUCT 24" TYPE "L" CURB & GUTTER PER CCAUSD #216.
  - CONSTRUCT TYPE "A" CURB PER CCAUSD #219.
  - 0" CURB FACE PER DETAIL ON SHEET DT3
  - CONSTRUCT 3" VALLEY GUTTER PER THE DETAIL ON SHEET DT3
  - CONSTRUCT 8" VALLEY GUTTER PER CCAUSD # 228
  - CONSTRUCT 5' SIDEWALK PER CCAUSD # 234
  - INSTALL PRECAST BUMPER BLOCK PER CCAUSD #238.
  - INSTALL LANDSCAPE ROCK D50=6" 12" THK
  - CONSTRUCT 2" CURB CUT PER DETAIL ON SHEET DT3
  - CONSTRUCT SIDE WALK UNDER DRAIN PER CCAUSD #236.
  - CONSTRUCT "U" CHANNEL PER DETAIL ON SHEET DT3
  - CONSTRUCT COMMERCIAL DRIVEWAY PER CCAUSD #225
  - CONSTRUCT 6" PVC STORM DRAIN
  - INSTALL WROUGHT IRON FENCE WITH A 6" CLEAR SPACE @ THE BOTTOM FOR UNOBSTRUCTED STORM RUNOFF FLOW. SEE DETAIL "Y" ON SHEET DT2.
  - HANDICAP ACCESS TO THE RIGHT OF WAY
  - REMOVE EXISTING PAVEMENT

- COORDINATION ITEMS**
- SEE ARCHITECTURAL DRAWINGS FOR TRASH ENCLOSURE PLAN AND DETAILS. MAXIMUM 1% SLOPE ON TRASH ENCLOSURE SLAB.
  - SEE ARCHITECTURAL AND LANDSCAPE PLANS FOR DETAILS OF OPEN SPACE AREAS.

**ENGINEER DISCLAIMER NOTE:**  
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I CERTIFY THAT THIS GRADING PLAN CONFORMS TO THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE WITH LAS VEGAS, NV, #-----

*William J. Meyer* 3/8/18  
15745, P.E. NO. WILLIAM J. MEYER DATE

**BENCHMARK**  
PROJECT DATUM: NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)  
CITY OF LAS VEGAS BENCHMARK: 2LV0013NE6 (REVISED 2008)  
NAVD88 ELEVATION: 679.739 METERS (2230.11 FEET)  
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**BASIS OF BEARING**  
GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS ZONE, NORTH AMERICAN DATUM OF 1983, SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.  
LINEAR UNIT: US SURVEY FOOT (FTUS)  
DATUM (REFERENCE FRAME): NAD 83 (2011) EPOCH 2010.00  
SYSTEM: NEVADA COORDINATE REFERENCE SYSTEM (NCRS)  
ZONE: LAS VEGAS  
PROJECTION: TRANSVERSE MERCATOR  
STANDARD PARALLEL (AND LATITUDE OF GRID ORIGIN): 36°15'00"N  
LONGITUDE OF CENTRAL MERIDIAN: 114°58'00"W  
NORTHING AT GRID ORIGIN: 200,000,000 M (656,166,667 FTUS)  
EASTING AT CENTRAL MERIDIAN: 100,000,000 M (328,083,333 FTUS)  
SCALE FACTOR ON CENTRAL MERIDIAN: 1.0001 (EXACT)

**Call before you Dig**  
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1-702-227-2929  
CLARK COUNTY TRAFFIC OPERATIONS

**Call before you Dig**  
1-702-455-7511  
1-702-227-2929  
CLARK COUNTY TRAFFIC OPERATIONS

**SIGHT VISIBILITY ZONES:**  
NO STRUCTURE, WALLS, VEGETATION, OR OBJECT OF ANY KIND IS PERMITTED OVER TWENTY-FOUR (24) INCHES IN HEIGHT (MEASURED FROM THE TOP OF ADJACENT CURB IF CURB EXISTS) WITHIN THE SIGHT VISIBILITY ZONES.

**EARTHWORK QUANTITIES**

| CUT               | FILL               | NET                       |
|-------------------|--------------------|---------------------------|
| 8,336 CUBIC YARDS | 19,754 CUBIC YARDS | 11,418 CUBIC YARDS (FILL) |

**GRADING PERMIT NOTE**  
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**GEOTECHNICAL NOTE:**  
REFER TO SOILS REPORT: ---  
PROJECT # ---, DATED ---  
HTE # ---

| SIDEWALK RAMPS TABLE<br>(PER CCAUSD No. 235, CASE I) |         |         |      |
|------------------------------------------------------|---------|---------|------|
| NO.                                                  | DIM "A" | DIM "B" | CASE |
| 1                                                    | 4.5'    | 12'     | I    |
| 2                                                    | 4.5'    | 9.5'    | I    |
| 3                                                    | 6'      | 6'      | I    |
| 4                                                    | 9.5'    | 4.5'    | I    |
| 5                                                    | 12'     | 4.5'    | I    |

**EAB INVESTMENT COMPANY**  
3065 N. RANCHO #130  
LAS VEGAS, NV 89113

**GRADING PLAN 4**

**CRYSTAL PARK APARTMENTS**

**ENGINEER**  
WILLIAM J. MEYER  
CIVIL  
15745, P.E. NO. WILLIAM J. MEYER

**DESIGNED BY:** WJM  
**CHECKED BY:** WJM  
**PROJECT NO.:** 7544

**DATE:** 3/8/18

**SCALE:** 1"=20'

**REVISION**

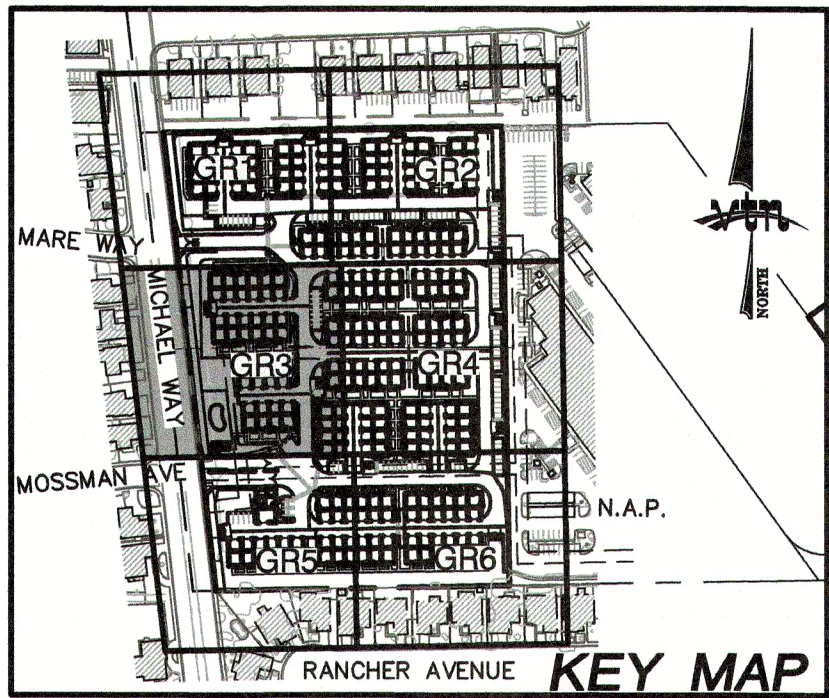
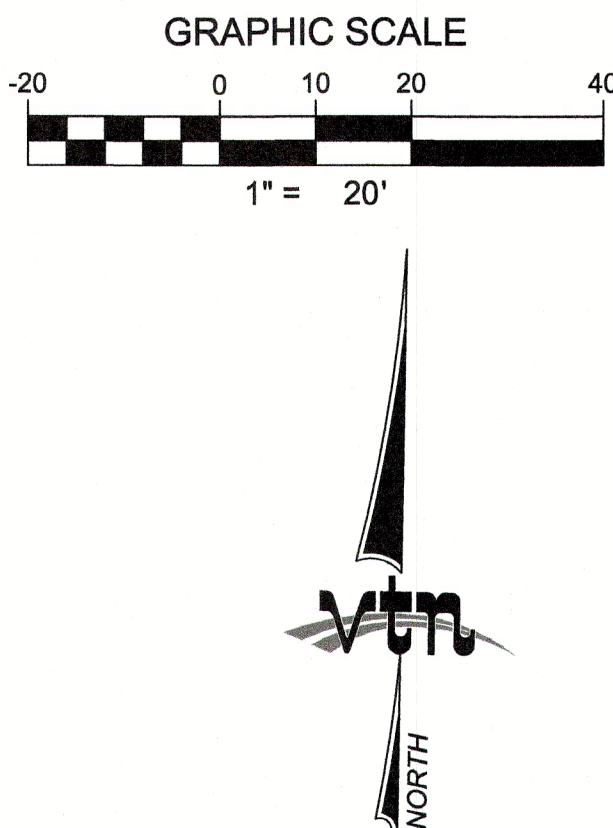
**BY**

**DATE**

**REV**

**15744 (Sheet) 3/8/18 GR-04**





## CONSTRUCTION NOTES

- ① CONSTRUCT 24" TYPE "L" CURB & GUTTER PER CCAUSD #216.
- ② CONSTRUCT TYPE "A" CURB PER CCAUSD #219.
- ③ 0" CURB FACE PER DETAIL ON SHEET D3
- ④ CONSTRUCT 3" VALLEY GUTTER PER THE DETAIL ON SHEET D73
- ⑤ CONSTRUCT 8" VALLEY GUTTER PER CCAUSD # 228
- ⑥ CONSTRUCT 5" SIDEWALK PER CCAUSD # 234
- ⑦ INSTALL PRECAST BUMPER BLOCK PER CCAUSD #238.
- ⑧ INSTALL LANDSCAPE ROCK D50=6" 12" THK
- ⑨ CONSTRUCT 2" CURB CUT PER DETAIL ON SHEET D73
- ⑩ CONSTRUCT SIDE WALK UNDER DRAIN PER CCAUSD #236.
- ⑪ CONSTRUCT "U" CHANNEL PER DETAIL ON SHEET D73
- ⑫ CONSTRUCT COMMERCIAL DRIVEWAY PER CCAUSD #225
- ⑬ CONSTRUCT 6" PVC STORM DRAIN
- ⑭ INSTALL WROUGHT IRON FENCE WITH A 4" CLEAR SPACE @ THE BOTTOM FOR UNOBSTRUCTED STORM RUNOFF FLOW. SEE DETAIL "Y" ON SHEET D72.

■■■■■ HANDCAP ACCESS TO THE RIGHT OF WAY

■■■■■ REMOVE EXISTING PAVEMENT

(A) SEE ARCHITECTURAL DRAWINGS FOR TRASH ENCLOSURE PLAN AND DETAILS. MAXIMUM 1% SLOPE ON TRASH ENCLOSURE SLAB.

(B) SEE ARCHITECTURAL AND LANDSCAPE PLANS FOR DETAILS OF OPEN SPACE AREAS.

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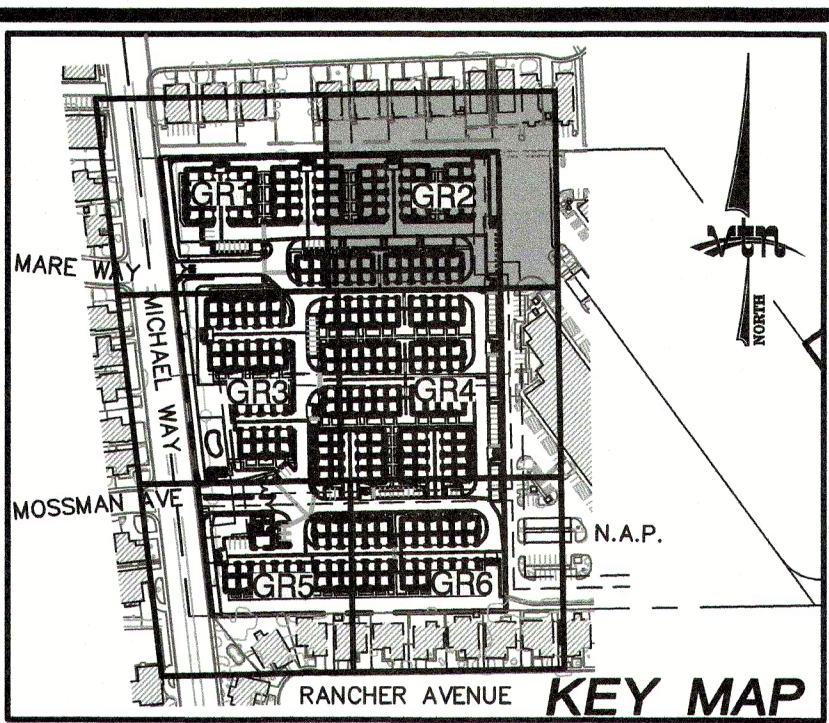
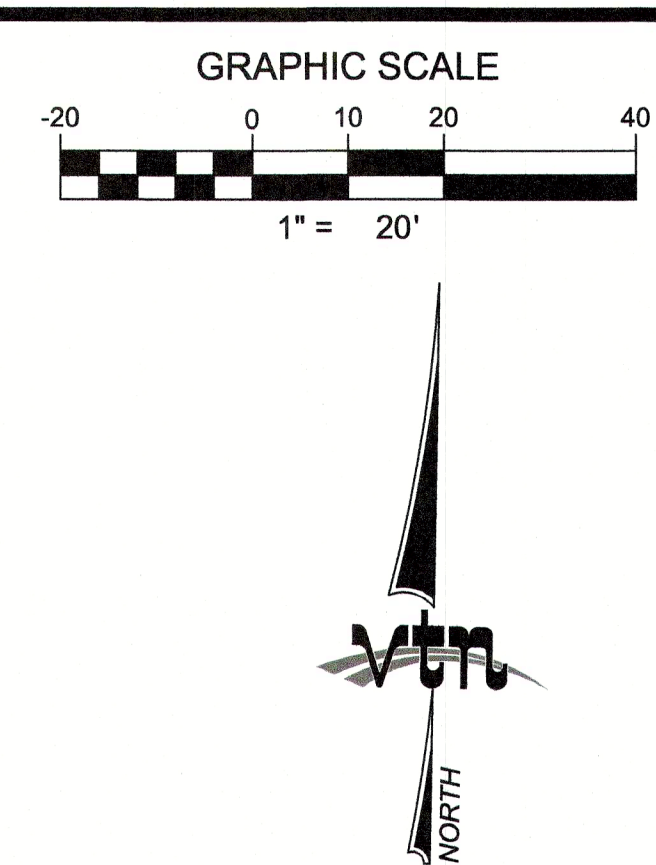
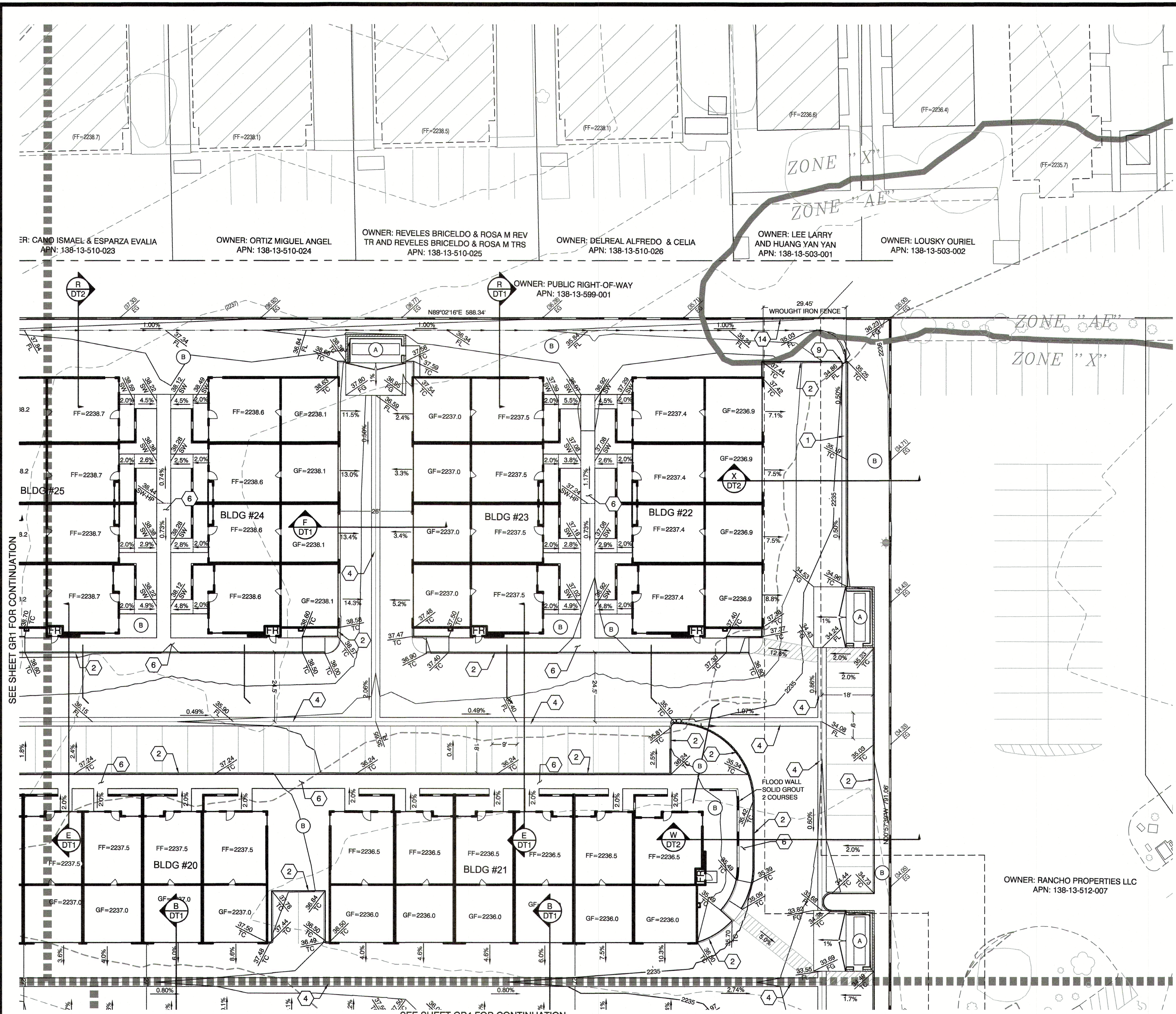
I CERTIFY THAT THIS GRADING PLAN CONFORMS TO THE  
APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE WITH LAS  
VEGAS, NV, #---

*William J. Meyer* 3/8/10

15745, P.E. No. WILLIAM J. MEYER DATE

|                                                                              |  |                                 |  |            |  |                       |                                                                             |                                                                                                                                                                                                           |  |      |      |    |          |
|------------------------------------------------------------------------------|--|---------------------------------|--|------------|--|-----------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|------|------|----|----------|
| <div><p>WILLIAM J. MEYER<br/>EXP. 12/31/19<br/>CIVIL</p><p>376 118</p></div> |  | DRAWN BY: _____<br>KDH          |  | 08/14/2017 |  | <b>GRADING PLAN 3</b> | <b>EAB INVESTMENT COMPANY</b><br>9065 N. RANCHO #130<br>LAS VEGAS, NV 89113 | <b>LAS VEGAS, NV</b><br><br>2727 SOUTH RAINBOW BOULEVARD<br>LAS VEGAS, NEVADA 89146-5148<br>PH: (702) 873-7550 FAX: (702) 362-2597 WEB: WWW.VTNNV.COM<br>CONSULTING ENGINEERS • PLANNERS • LAND SURVEYORS |  | REV' | DATE | BY | REVISION |
| DESIGNED BY: _____<br>JEM                                                    |  | 08/14/2017                      |  |            |  |                       |                                                                             |                                                                                                                                                                                                           |  |      |      |    |          |
| CHECKED BY: _____<br>WJM                                                     |  | 08/14/2017                      |  |            |  |                       |                                                                             |                                                                                                                                                                                                           |  |      |      |    |          |
| PROJECT NO: _____<br>7844                                                    |  | SCALE: 1"=30'<br>HORIZ<br>VERT. |  |            |  |                       |                                                                             |                                                                                                                                                                                                           |  |      |      |    |          |
| SHEET<br><b>GR3</b><br>11 OF 23 SHEETS<br>DRAWING NO. _____                  |  |                                 |  |            |  |                       |                                                                             |                                                                                                                                                                                                           |  |      |      |    |          |





| LEGEND                   |          |          |          |
|--------------------------|----------|----------|----------|
| DESCRIPTION              | PROPOSED | EXISTING | FUTURE   |
| CONTOUR (5' INTERVAL)    | —2450—   | —(2450)— | —(2450)— |
| CONTOUR (1" INTERVAL)    |          |          |          |
| EDGE OF PAVEMENT         |          |          |          |
| SAW CUT                  |          |          |          |
| RETAINING WALL           |          |          |          |
| SCREEN WALL              |          |          |          |
| RIGHT OF WAY             |          |          |          |
| CENTER LINE              |          |          |          |
| BACK OF CURB             |          |          |          |
| LIP OF GUTTER            |          |          |          |
| FACE OF CURB             |          |          |          |
| SIDEWALK                 |          |          |          |
| UNIT BOUNDARY LINE       |          |          |          |
| PROPERTY LINE            |          |          |          |
| SLOPE AND FLOW DIRECTION |          |          |          |
| SCARP AREA               |          |          |          |
| MATCHLINE                |          |          |          |
| SIDEWALK RAMP            |          |          |          |
| SIGHT VISIBILITY ZONES   |          |          |          |
| PAVED ROAD               |          |          |          |
| PAVEMENT REMOVAL         |          |          |          |
| RIP RAP                  |          |          |          |
| LANDSCAPE ROCK           |          |          |          |

- CONSTRUCTION NOTES**
- CONSTRUCT 24" TYPE "L" CURB & GUTTER PER CCAUSD #216.
  - CONSTRUCT TYPE "A" CURB PER CCAUSD #219.
  - 0" CURB FACE PER DETAIL ON SHEET DT3
  - CONSTRUCT 3" VALLEY GUTTER PER THE DETAIL ON SHEET DT3
  - CONSTRUCT 8" VALLEY GUTTER PER CCAUSD # 228
  - CONSTRUCT 5" SIDEWALK PER CCAUSD # 234
  - INSTALL PRECAST BUMPER BLOCK PER CCAUSD #238.
  - INSTALL LANDSCAPE ROCK D50=6" 12" THK
  - CONSTRUCT 2" CURB CUT PER DETAIL ON SHEET DT3
  - CONSTRUCT SIDE WALK UNDER DRAIN PER CCAUSD #236.
  - CONSTRUCT "U" CHANNEL PER DETAIL ON SHEET DT3
  - CONSTRUCT COMMERCIAL DRIVEWAY PER CCAUSD #225
  - CONSTRUCT 6" PVC STORM DRAIN
  - INSTALL WROUGHT IRON FENCE WITH A 6" CLEAR SPACE @ THE BOTTOM FOR UNOBSTRUCTED STORM RUNOFF FLOW. SEE DETAIL "Y" ON SHEET DT2.
  - HANDICAP ACCESS TO THE RIGHT OF WAY
  - REMOVE EXISTING PAVEMENT

- COORDINATION ITEMS**
- SEE ARCHITECTURAL DRAWINGS FOR TRASH ENCLOSURE PLAN AND DETAILS. MAXIMUM 1% SLOPE ON TRASH ENCLOSURE SLAB.
  - SEE ARCHITECTURAL AND LANDSCAPE PLANS FOR DETAILS OF OPEN SPACE AREAS.

**ENGINEER DISCLAIMER NOTE:**  
UTILITY LOCATIONS SHOWN HERE ON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT HORIZONTAL AND VERTICAL LOCATION OF ALL EXISTING UNDERGROUND AND OVERHEAD UTILITIES AND NOTIFY THE DESIGN ENGINEER IMMEDIATELY OF ANY DISCREPANCIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HERE ON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

I CERTIFY THAT THIS GRADING PLAN CONFORMS TO THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE WITH LAS VEGAS, NV, #—  
*William J. Meyer* 3/8/18  
15745, P.E. NO. WILLIAM J. MEYER DATE

**BENCHMARK**  
PROJECT DATUM: NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)  
CITY OF LAS VEGAS BENCHMARK: 2LV0013NE6 (REVISED 2008)  
NAVD88 ELEVATION: 679.739 METERS (2230.11 FEET)  
FOUND RIVET AND PLATE IN THE TOP OF CURB ON THE WEST SIDE OF RANCHO AT 3101 RANCHO

**BASIS OF BEARING**  
GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.  
LINEAR UNIT: US SURVEY FOOT (FTUS)  
DATUM (REFERENCE FRAME): NAD 83 (2011) EPOCH 2010.00  
SYSTEM: NEVADA COORDINATE REFERENCE SYSTEM (NCRS)  
ZONE: LAS VEGAS  
PROJECTION: TRANSVERSE MERCATOR  
STANDARD PARALLEL (AND LATITUDE OF GRID ORIGIN): 36°15'00"N  
LONGITUDE OF CENTRAL MERIDIAN: 114°58'00"W  
NORTHING AT GRID ORIGIN: 200,000,000 M (656,166,667 FTUS)  
EASTING AT CENTRAL MERIDIAN: 100,000,000 M (328,083,333 FTUS)  
SCALE FACTOR ON CENTRAL MERIDIAN: 1.0001 (EXACT)

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CLARK COUNTY TRAFFIC OPERATIONS

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1-702-227-2629

**SIGHT VISIBILITY ZONES:**  
NO STRUCTURE, WALLS, VEGETATION, OR OBJECT OF ANY KIND IS PERMITTED OVER TWENTY-FOUR (24) INCHES IN HEIGHT (MEASURED FROM THE TOP OF ADJACENT CURB IF CURB EXISTS) WITHIN THE SIGHT VISIBILITY ZONES.

| EARTHWORK QUANTITIES |             |                    |
|----------------------|-------------|--------------------|
| CUT                  | FILL        | NET                |
| 8,336                | 19,754      | 11,418             |
| CUBIC YARDS          | CUBIC YARDS | CUBIC YARDS (FILL) |

**GRADING PERMIT NOTE**  
THIS GRADING PERMIT DOES NOT INCLUDE THE CONSTRUCTION OF RETAINING WALLS AND OTHERS STRUCTURES. SEPARATE PERMITS AND APPLICATIONS ARE REQUIRED FOR THESE.

**GEOTECHNICAL NOTE:**  
REFER TO SOILS REPORT: —  
PROJECT # —, DATED —  
HTE # —

| SIDEWALK RAMPS TABLE         |         |         |      |
|------------------------------|---------|---------|------|
| (PER CCAUSD No. 235, CASE I) |         |         |      |
| NO.                          | DIM "A" | DIM "B" | CASE |
| 1                            | 4.5'    | 12'     | I    |
| 2                            | 4.5'    | 9.5'    | I    |
| 3                            | 8'      | 8'      | I    |
| 4                            | 9.5'    | 4.5'    | I    |
| 5                            | 12'     | 4.5'    | I    |

**EAB INVESTMENT COMPANY**  
3065 N. RANCHO #130  
LAS VEGAS, NV 89113

**GRADING PLAN 2**

**CRYSTAL PARK APARTMENTS**

**LAS VEGAS, NV**

**2727 SOUTH RAINBOW BOULEVARD**  
LAS VEGAS, NEVADA 89146-5148  
PH: (702) 673-7550 FAX: (702) 362-2587 WEB: WWW.VTNN.COM  
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**VTNN**

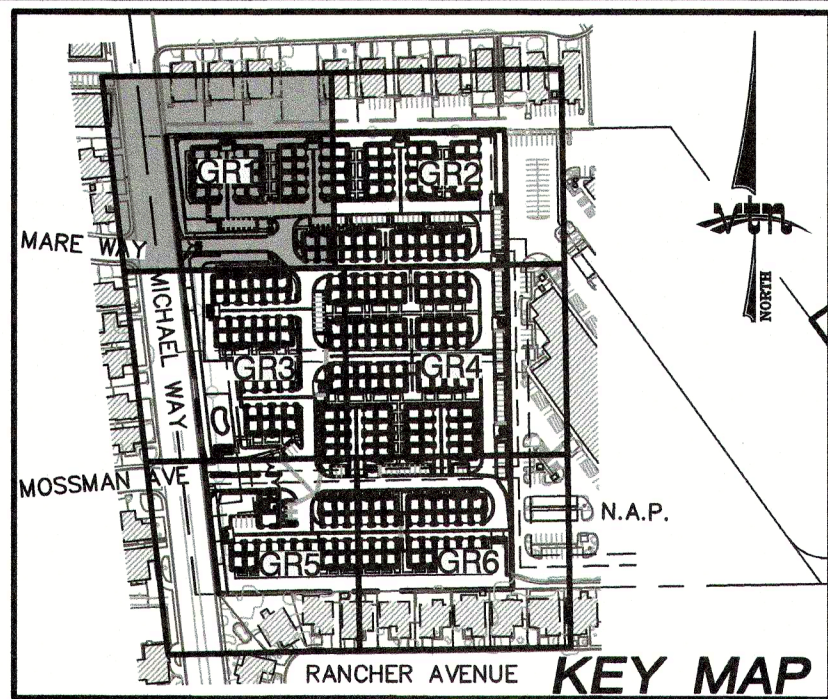
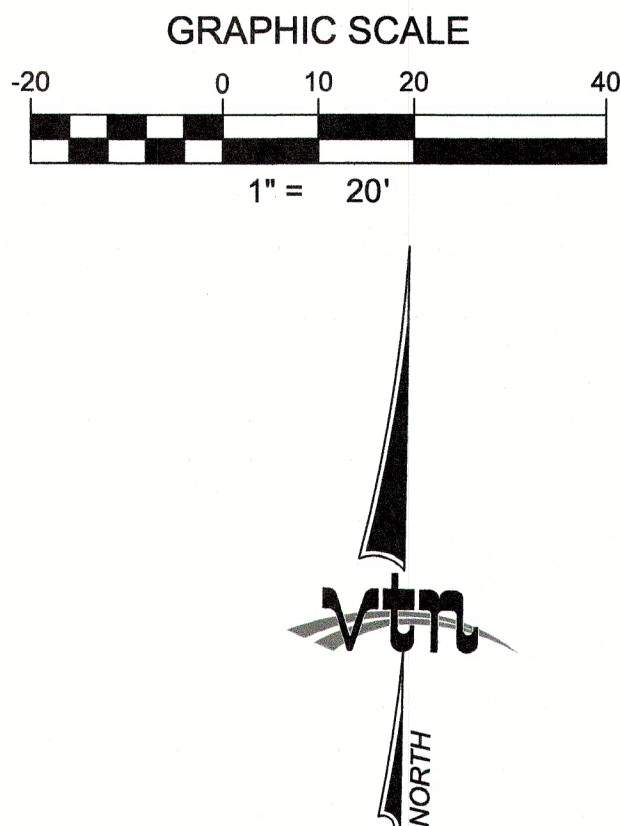
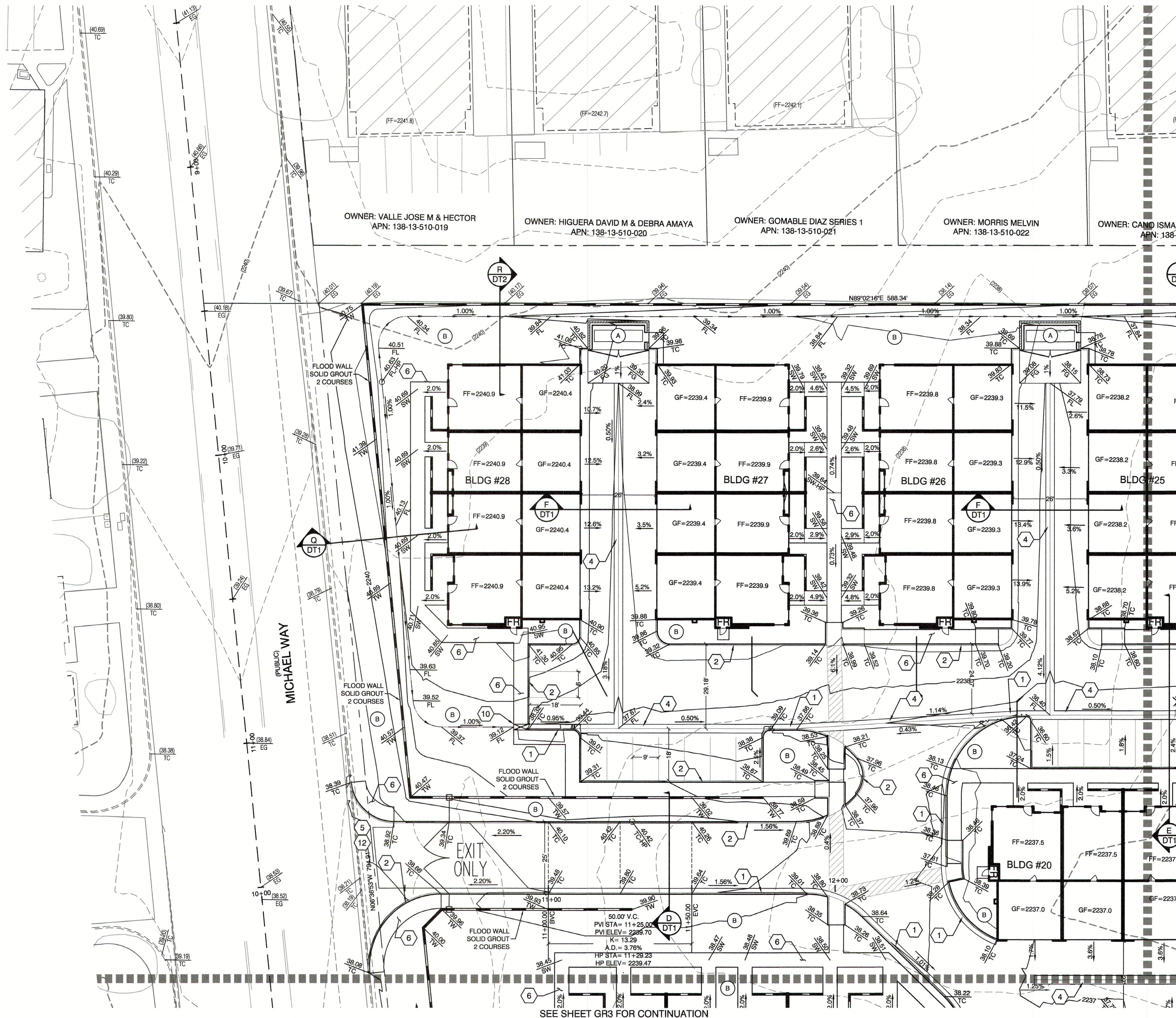
**PROFESSIONAL ENGINEER - STATE OF NEVADA**  
WILLIAM J. MEYER  
EXP: 12/31/19  
CIVIL  
No. 15745

**3/8/18**

**GR2**  
10 OF 23 SHEETS  
DRAWING NO.

DRAWN BY: KGH  
DESIGNED BY: ZEN  
CHECKED BY: WJM  
PROJECT NO: 7844  
SCALE: 1"=20'  
HORIZ: N/A  
VERT: N/A





| LEGEND                   |          |          |          |
|--------------------------|----------|----------|----------|
| DESCRIPTION              | PROPOSED | EXISTING | FUTURE   |
| CONTOUR (5' INTERVAL)    | —(2450)— | —(2450)— | —(2450)— |
| CONTOUR (1' INTERVAL)    | —(2450)— | —(2450)— | —(2450)— |
| EDGE OF PAVEMENT         | —        | —        | —        |
| SAW CUT                  | —        | —        | —        |
| RETAINING WALL           | —        | —        | —        |
| SCREEN WALL              | —        | —        | —        |
| RIGHT OF WAY             | —        | —        | —        |
| CENTER LINE              | —        | —        | —        |
| BACK OF CURB             | —        | —        | —        |
| LIP OF GUTTER            | —        | —        | —        |
| FACE OF CURB             | —        | —        | —        |
| SIDEWALK                 | —        | —        | —        |
| UNIT BOUNDARY LINE       | —        | —        | —        |
| PROPERTY LINE            | —        | —        | —        |
| SLOPE AND FLOW DIRECTION | —        | —        | —        |
| SCARP AREA               | —        | —        | —        |
| MATCHLINE                | —        | —        | —        |
| SIDEWALK RAMP            | —        | —        | —        |
| SIGHT VISIBILITY ZONES   | —        | —        | —        |
| PAVED ROAD               | —        | —        | —        |
| PAVEMENT REMOVAL         | —        | —        | —        |
| RIP RAP                  | —        | —        | —        |
| LANDSCAPE ROCK           | —        | —        | —        |

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*William J. Meyer* 3/8/18  
16745, P.E. No. WILLIAM J. MEYER DATE

**BENCHMARK**  
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SYSTEM: NEVADA COORDINATE REFERENCE SYSTEM (NCRS)

ZONE: LAS VEGAS

PROJECTION: TRANSVERSE MERCATOR  
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EASTING AT CENTRAL MERIDIAN: 100,000,000 M (328,083,333 FTUS)  
SCALE FACTOR ON CENTRAL MERIDIAN: 1.0001 (EXACT)

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**1-702-227-2929**

| SIGHT VISIBILITY ZONES:                                                                                                                                                                               |                    |                           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------------------|
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| EARTHWORK QUANTITIES                                                                                                                                                                                  |                    |                           |
| CUT                                                                                                                                                                                                   | FILL               | NET                       |
| 8,336 CUBIC YARDS                                                                                                                                                                                     | 19,754 CUBIC YARDS | 11,418 CUBIC YARDS (FILL) |
| GRADING PERMIT NOTE                                                                                                                                                                                   |                    |                           |
| THIS GRADING PERMIT DOES NOT INCLUDE THE CONSTRUCTION OF RETAINING WALLS AND OTHERS STRUCTURES. SEPARATE PERMITS AND APPLICATIONS ARE REQUIRED FOR THESE.                                             |                    |                           |
| GEOTECHNICAL NOTE:                                                                                                                                                                                    |                    |                           |
| REFER TO SOILS REPORT: ---<br>PROJECT #---, DATED ---<br>HTE #---                                                                                                                                     |                    |                           |

| SIDEWALK RAMPS TABLE<br>(PER CCAUSD No. 235, CASE I) |         |         |      |
|------------------------------------------------------|---------|---------|------|
| NO.                                                  | DIM "A" | DIM "B" | CASE |
| 1                                                    | 4.5'    | 12'     | I    |
| 2                                                    | 4.5'    | 9.5'    | I    |
| 3                                                    | 8'      | 8'      | I    |
| 4                                                    | 9.5'    | 4.5'    | I    |
| 5                                                    | 12'     | 4.5'    | I    |

**EAB INVESTMENT COMPANY**  
3065 N. RANCHO #130  
LAS VEGAS, NV 89113

**GRADING PLAN 1**

**CRYSTAL PARK APARTMENTS**

**LAS VEGAS, NV**

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**WILLIAM J. MEYER**  
CIVIL  
EXP: 12/31/19  
16745, P.E. No. WILLIAM J. MEYER

**9 OF 23 SHEETS**  
DRAWING NO. ---

DATE: 3/8/18



CITY OF LAS VEGAS GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE 'UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA', LATEST ISSUE, THE 'UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION, CLARK COUNTY AREA, NEVADA', LATEST REVISED EDITION, THE 'SUMMERLIN IMPROVEMENT STANDARDS' FOR WORK IN SUMMERLIN AREA, AND OTHER APPLICABLE APPROVED STANDARDS ISSUED BY THE CONTROLLING AGENCY, THE 'UNIFORM BUILDING CODE', AND ALL LOCAL CITY CODES AND ORDINANCES APPLICABLE, EXCEPT AS NOTED ON THIS SHEET AS 'DEVIATIONS FROM STANDARDS'.
2. THE EXISTENCE AND LOCATION OF ANY OVERHEAD OR UNDERGROUND UTILITY LINES, PIPES, OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A RESEARCH OF THE AVAILABLE RECORDS. EXISTING UTILITIES AS SHOWN FROM CLV PLANS LIBRARY ARE APPROXIMATE AND FOR RECORD PURPOSES. EXISTING UTILITIES ARE LOCATED ON PLANS ONLY FOR THE CONVENIENCE OF THE CONTRACTOR. EXISTING UTILITY SERVICE LATERALS MAY NOT BE SHOWN ON THE PLANS. THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, LOCATE ALL UNDERGROUND AND OVERHEAD INTERFERENCES WHICH MAY AFFECT HIS OPERATION DURING CONSTRUCTION AND SHALL TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGE TO SAME. THE CONTRACTOR SHALL USE EXTREME CAUTION WHEN WORKING NEAR OVERHEAD UTILITIES SO AS TO SAFELY PROTECT ALL PERSONNEL AND EQUIPMENT, AND SHALL BE RESPONSIBLE FOR ALL COST AND LIABILITY IN CONNECTION THEREWITH.
3. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING UTILITY LINES, STRUCTURES AND STREET IMPROVEMENTS WHICH ARE TO REMAIN IN PLACE, FROM DAMAGE, AND ALL SUCH IMPROVEMENTS OR STRUCTURES DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED OR REPLACED SATISFACTORY TO THE CITY ENGINEER AND OWNING UTILITY COMPANY AT THE EXPENSE OF THE CONTRACTOR.
4. ALL CONSTRUCTION SHALL BE AS SHOWN ON THESE PLANS, ANY REVISIONS SHALL HAVE THE PRIOR WRITTEN APPROVAL OF THE CITY ENGINEER.
5. TYPE V CEMENT SHALL BE USED IN ALL OFF-SITE CONCRETE WORK. CONCRETE TO BE 3000 P.S.I. MINIMUM @ 28 DAYS. MIX DESIGN TO BE APPROVED BY THE CITY PRIOR TO THE USE ON THE PROJECT.
6. PERMITS ARE REQUIRED FOR ANY WORK IN THE PUBLIC RIGHT-OF-WAY. THE CONTRACTOR SHALL SECURE ALL PERMITS AND INSPECTIONS REQUIRED FOR THIS CONSTRUCTION.
7. EXPANSION JOINTS REQUIRED, MAXIMUM EVERY 300' IN EXTRUDED-TYPE CURB.
8. AC PAVEMENT TO BE ONE-HALF INCH (1/2") ABOVE LIP OF ALL GUTTERS AFTER COMPACTION, EXCEPT AT SIDEWALK RAMPS AND CROSS GUTTERS.
9. CURB AND GUTTER FOUND TO BE UNACCEPTABLE TO THE CITY OF LAS VEGAS SHALL BE REMOVED AND REPLACED PER STANDARD DRAWING 216.
10. SIDEWALK RAMPS SHALL BE CONSTRUCTED IN EACH QUADRANT OF AN INTERSECTION PER STANDARD DRAWING 235. EXACT LOCATION OF RAMPS MAY BE ADJUSTED IN THE FIELD BY A CITY INSPECTOR.
11. CONTRACTOR SHALL PROVIDE ALL NECESSARY HORIZONTAL AND VERTICAL TRANSITIONS BETWEEN NEW CONSTRUCTION AND EXISTING SURFACES TO PROVIDE FOR PROPER DRAINAGE AND FOR INGRESS AND EGRESS TO NEW CONSTRUCTION. THE EXTENT OF TRANSITIONS TO BE SHOWN ON PLANS.
12. ALL GRADING WORK SHALL CONFORM TO THE SOILS REPORT AS PREPARED BY: ---, PROJECT NO. ---, DATED ---.
13. EXACT LOCATION OF ALL SAWCUT LINES MAY BE ADJUSTED OR DETERMINED IN THE FIELD BY A CITY OF LAS VEGAS ENGINEER IF LOCATION ON PLANS IS NOT CLEARLY SHOWN, OR EXISTING PAVEMENT CONDITION REQUIRES REALLOCATIONS.
14. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO PROTECT EXISTING PERMANENT SURVEY MONUMENTS. ANY MONUMENTS DISTURBED SHALL BE REPLACED AND ADJUSTED PER AVAILABLE RECORDS IN ACCORDANCE WITH N.R.S. STATUTE NO. 625.380 AND CITY OF LAS VEGAS TITLE 16, APPENDIX D.
15. UTILITY COMPANY METER BOXES, MANHOLE LIDS, VALVE COVERS, ETC., SHALL BE LOCATED OUT OF DRIVEWAYS, DRIVEWAY APRONS, FLOWLINES, AND CROSS GUTTERS UNLESS WRITTEN APPROVAL IS GRANTED BY THE UTILITY COMPANY AND THE CITY ENGINEER.

WALL NOTES:

16. ALL WALLS, NEW OR EXISTING, ARE ONLY SHOWN ON CIVIL PLANS FOR THE PURPOSE OF REVIEWING GRADING RELATIONSHIPS, FLOOD CONTROL, AND SIGHT DISTANCE AT INTERSECTIONS. NEW WALLS REQUIRE A SEPARATE PERMIT AND INSPECTION BY THE BUILDING DEPARTMENT.
17. ASPHALT MIX DESIGN MUST BE SUBMITTED AND APPROVED BY THE CITY ENGINEER PRIOR TO THE PLACEMENT OF ASPHALT WITHIN CITY RIGHT OF WAY.
18. CONTRACTOR SHALL ADJUST ALL NEW AND EXISTING INLETS, VALVE BOXES, MANHOLE RIMS, AND SEWER CLEAN OUTS, ETC. TO FINISH GRADE AS APPLICABLE WHETHER OR NOT THEY ARE SHOWN ON THE PLANS.
19. MATERIALS, HANDLING AND PLACEMENT OF PORTLAND CEMENT CONCRETE SHALL BE IN ACCORDANCE WITH APPLICABLE SECTIONS OF 'NDOT' OR THE CLARK COUNTY AREA SPECIFICATIONS (AS APPLICABLE) AND THE PLANS AND DETAILS SHOWN HEREON.
20. WHEN INSTALLING UNDERGROUND FACILITIES THAT REQUIRE UNDERGROUND LOCATING DEVICES SUCH AS MARKER BALLS, LOCATING RIBBON, ETC., THE CONTRACTOR SHALL PROVIDE WRITTEN DOCUMENTATION TO OFFSITE INSPECTION AND TESTING CERTIFYING THAT ALL DEVICES HAVE BEEN PLACED AND VERIFIED TO BE IN GOOD WORKING CONDITION PRIOR TO THE CONSTRUCTION OF ANY ROAD BASE.
21. SANITARY SEWER AND STORM DRAIN FINAL LOCATION MAP(S) SHALL BE PROVIDED TO THE CITY AND APPROVED PRIOR TO ACCEPTANCE OF FACILITY VIDEO INSPECTION. PROJECT ACCEPTANCE. THE MAP(S) SHALL INCLUDE THE HORIZONTAL AND VERTICAL (INVERT) LOCATION OF PUBLIC SEWER MANHOLES, STORM DRAIN MANHOLES, STORM DRAIN LATERALS AT THE CONNECTION TO THE STORM DRAIN MAIN AND AT THE CONNECTION TO A DROP INLET, THE CONNECTION OF SEWER SERVICE LATERALS TO THE SEWER MAIN AND WHERE THE SEWER SERVICE LATERALS EXIT THE PUBLIC RIGHT-OF-WAY, AND STORM DRAIN MAIN ALIGNMENT, INCLUDING DEFLECTION POINTS. THE LOCATION SHALL BE DESCRIBED BY COORDINATES WHICH SHALL BE BASED ON THE OFFICIAL HORIZONTAL AND VERTICAL AND CERTIFIED BY A NEVADA PROFESSIONAL LAND SURVEYOR TO HAVE POSITIONAL CERTAINITIES OF +/- 0.09 METER (+/- 0.3 FEET) HORIZONTALLY AND VERTICALLY. A SEPARATE ELECTRONIC COMMA DELIMITED FILE FOR THE SANITARY SEWER AND STORM DRAIN COORDINATES SHALL ALSO ACCOMPANY THE SANITARY SEWER AND STORM DRAIN FINAL LOCATION MAP(S).
22. CCTV VIDEO INSPECTION IS REQUIRED FOR ALL SEWER AND STORM DRAINS. THE CCTV VIDEO INSPECTIONS NEED TO BE PERFORMED PER THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS LATEST EDITION.
23. A SEPARATE BORING PERMIT IS REQUIRED FOR BORING ACTIVITIES.

REVISED 04/05/10

CITY OF LAS VEGAS STREETLIGHT NOTES:

1. ALL STREET LIGHTING INSTALLATIONS SHALL BE IN ACCORDANCE WITH THE STREET LIGHTING PLANS. THE 'UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA', LATEST REVISION, AND THE 'UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA', LATEST REVISION.
2. NO DEVIATION OF STREET LIGHT, PULL BOX, CONDUITS (ETC.) LOCATIONS SHALL BE PERMITTED WITH OUT WRITTEN APPROVAL OF THE TRAFFIC/ELECTRICAL FIELD OPERATIONS DIVISION AND THE CITY ENGINEER. ANY DEVIATION FROM THE PLAN LOCATION WILL REQUIRE COMPLIANCE WITH SECTION 623.03.03 (E) OF THE SPECIFICATIONS.
3. ALL EXISTING STREET LIGHTING SHALL REMAIN OPERATIONAL DURING CONSTRUCTION.
4. ALL EMPTY CONDUIT SHALL HAVE PULL STRINGS INSTALLED PRIOR TO FINAL INSPECTION.
5. ANY STRUCTURE SUCH AS BLOCK WALLS, CHAIN LINK FENCES, RETAINING WALLS, ETC. SHALL LEAVE A MINIMUM CLEARANCE OF EIGHTEEN INCHES (18") TO THE FACE OF STREET LIGHTING POLE ON ALL SIDES WHEN STREETLIGHT IS INSTALLED BEHIND SIDEWALK, AND SHALL AT NO TIME COMPLETELY ENCLOSE THE STREET LIGHTING POLE.
6. AS-BUILT DRAWINGS SHALL BE SUPPLIED TO THE ELECTRICAL SERVICES SECTION PRIOR TO ANY PRE-FINAL INSPECTION. THE AS-BUILT DRAWING NEEDS TO BE STAMPED AS-BUILT AND SIGNED BY THE PREPARER.
7. SERVICE POINT SHALL BE COORDINATED WITH NEVADA POWER COMPANY, AND WHEREVER POSSIBLE, BE LOCATED NEAR THE CENTER OF THE CIRCUIT. SERVICE POINTS SHALL BE SHOWN ON THE PLANS.
8. IT SHALL BE ASSUMED THAT IN THE ABSENCE OF AN EXISTING, WORKABLE CIRCUIT TO ATTACH TO ALL INSTALLATIONS SHALL REQUIRE A NEW SERVICE FOR OPERATION OF THE CIRCUIT.
9. WHEREVER THERE IS AN OVERHEAD UTILITY THAT MAY CONFLICT WITH THE INSTALLATION OF STREET LIGHTING CIRCUITS AND/OR POLES, THESE CONFLICTS MUST BE RESOLVED BETWEEN THE DEVELOPER AND THE UTILITIES INVOLVED BEFORE STREETLIGHT BASES ARE INSTALLED AT NO EXPENSE TO THE CITY OF LAS VEGAS.
10. THE CONTRACTOR SHALL FURNISH COMPLETE SERVICE TO TRANSFORMERS AND CONTROL SYSTEMS IF REQUIRED ON PLANS.

DEPARTMENT OF PUBLIC WORKS NOTES

1. NON-STANDARD KNUCKLES APPROVED PER TMP-50117

CITY OF LAS VEGAS FIRE DEPARTMENT NOTES

1. ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH THE LAS VEGAS FIRE AND RESCUE ADOPTED FIRE CODE ORDINANCE #6324 FOR HYDRANT SPECIFICATIONS AND HYDRANT INSTALLATION SPECIFICATIONS.
2. ONLY FIRE HYDRANTS THAT ARE ON THE LAS VEGAS VALEY WATER DISTRICTS - APPROVED PRODUCTS LIST ARE ALLOWED TO BE INSTALLED.
3. A PERMIT IS REQUIRED FROM LAS VEGAS FIRE AND RESCUE FOR THE INSTALLATION OF ON-SITE WATER LINES AND FIRE HYDRANTS. THE PERMIT AND CONTRACTORS MATERIAL TEST CERTIFICATE FOR UNDERGROUND PIPING FORM SHALL BE OBTAINED FROM THE FIRE PROTECTION ENGINEER BEFORE COMMENCEMENT OF WORK.
4. ON ANY RESIDENTIAL OR COMMERCIAL INSTALLATIONS, FIRE HYDRANTS SHALL BE INSTALLED AND FIRE APPARATUS ACCESS ROADS SHALL BE MAINTAINED BEFORE COMMENCEMENT OF ANY COMBUSTIBLE CONSTRUCTION. ALL FIRE HYDRANTS SHALL BE IN GOOD WORKING ORDER AND SHALL BE CAPABLE OF DELIVERING THE REQUIRED FIRE FLOW. **SNFC #6124, SECTION 1412**
5. TO IDENTIFY THE FIRE HYDRANT LOCATIONS, THE CONTRACTOR SHALL PLACE A BLUE REFLECTIVE MARKER AT THE CENTERLINE OF THE STREET ADJACENT TO THE FIRE HYDRANTS. **SNFC #6124 SECTION 507.5.7.3**
6. ALL UNDERGROUND INSPECTIONS, PRESSURE AND FLUSH VERIFICATIONS OF ALL FIRE HYDRANTS AND FIRE LINES, SHALL BE CONDUCTED BEFORE COVERING THE LINES. CENTER LOADING IS ACCEPTABLE FOR THE HYDRO TESTS WITH PRIOR FIRE PREVENTION APPROVAL.
7. ALL ON-SITE UNDERGROUND WATER MAINS AND MATERIALS SHALL BE U.L. LISTED, A.W.W.A. APPROVED AND SHALL BE RATED FOR THE APPROPRIATE WORKING PRESSURE. **SNFC 507.2.1, NFPA 24**
8. PAINTING OF CURBS, FIRE HYDRANTS, PADS, PROTECTION OF FIRE HYDRANTS FROM PHYSICAL DAMAGE, AND ALL OTHER WORK NECESSARY PER PLANS SHALL BE COMPLETED BEFORE APPROVAL BY LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION. **IFC 507; SNFC 507.5.7**
9. PRIVATE HYDRANTS SHALL BE PAINTED RED. **SNFC 507.5.7.1**
10. PRIOR TO THE FINAL OCCUPANCY, A FIRE FLOW TEST SHALL BE WITNESSED BY LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION TO VERIFY AVAILABILITY OF THE REQUIRED FIRE FLOW. **IFC 507; SNFC 507.1**
11. FIRE HYDRANT SPACING SHALL BE AS FOLLOWS: **SNFC C102**
- RESIDENTIAL - 500 FT UNSPRINKLERED, 600 FT SPRINKLERED.
- COMMERCIAL - 300 FT UNSPRINKLERED, 400 FT SPRINKLERED.
12. WHERE THE WATER MAINS ARE EXTENDED ALONG STREETS OR NEW STREETS ARE INSTALLED WHERE FIRE HYDRANTS ARE NOT NEEDED FOR PROTECTION OF THE STRUCTURES, FIRE HYDRANTS SHALL BE INSTALLED AT A MAXIMUM OF 1000 FT SPACING, TO PROVIDE FOR TRANSPORTATION HAZARDS. WHERE STREETS ARE PROVIDED WITH MEDIAN DIVIDERS OR HAVE FOUR (4) OR MORE TRAFFIC LANES AND HAVE A TRAFFIC COUNT OF MORE THAN 30,000 PER DAY, HYDRANTS ARE REQUIRED ON EACH SIDE OF THE STREET SPACED AT 500 FT ON AN ALTERNATING BASIS. **SNFC C102.14**
13. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN THE RADIUS OF A CUL-DE-SAC OR WITHIN 20 FT OF THE PERIMETER OF THE RADIUS OF THE CUL-DE-SAC.
14. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN 6 FT OF ANY CURB RETURN, DRIVEWAY, POWER POLE, STREETLIGHT OR ANY OTHER OBSTRUCTION. **SNFC C102.12**
15. A MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A ONE-TWO FAMILY DWELLING SHALL NOT EXCEED 300 FT, AS MEASURED BY AN APPROVED ROUTE. **SNFC 102.4**
16. THE MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A FIRE DEPARTMENT CONNECTION (FDC) SHALL NOT EXCEED 100 FT, AS MEASURED BY AN APPROVED ROUTE. **SNFC C102.7**
17. THE MAXIMUM DISTANCE FROM A HYDRANT TO THE END OF A DEAD-END STREET SHALL NOT EXCEED 200 FT. **SNFC 102.6**
18. TWO (2) SOURCES OF SUPPLY ARE REQUIRED WHENEVER THERE IS 4 OR MORE FIRE HYDRANTS/SPRINKLER LEAD-INS ARE INSTALLED ON A SINGLE SYSTEM. SECTIONAL CONTROL VALVES SHALL BE INSTALLED SO THAT NO MORE THAN 2 FIRE HYDRANTS CAN BE OUT OF SERVICE DUE TO A BREAK IN A WATER MAIN.
19. ALL FIRE APPARATUS ACCESS ROADS SHALL BE PAVED TO PROVIDE ALL-WEATHER DRIVING CAPABILITIES, AND SHALL BE DESIGNED AND MAINTAINED TO SUPPORT THE IMPOSED LOADS OF THE FIRE APPARATUS. **SNFC 503.2.3**
20. THE GRADIENT FOR THE FIRE APPARATUS ACCESS ROADS SHALL NOT EXCEED 12%, ANGLES OF APPROACH AND ANGLES OF DEPARTURE SHALL NOT EXCEED 6% FOR 25 FT PRIOR TO OR AFTER THE GRADE CHANGE. ADJACENT TO THE STRUCTURES GRADIENT SHALL NOT EXCEED 6%. **SNFC 503.2.7 / 503.2.8**
21. THE TURNING RADIUS OF THE FIRE APPARATUS ACCESS ROADS SHALL BE NO LESS THAN 52 FT OUTSIDE AND 28 FT INSIDE TURNING RADIUS. **IFC SNFC 503.2.4**
22. VERTICAL CLEARANCE OF ALL FIRE APPARATUS ACCESS ROADS SHALL NOT BE LESS THAN 13FT 6 INS. **SNFC 503.2.1.1 / IFC 503**
23. FIRE DEPARTMENT ACCESS ROADS IN ALL RESIDENTIAL DEVELOPMENTS (EXCEPT APARTMENT BUILDINGS) SHALL HAVE A MINIMUM UNOBSTRUCTED WIDTH OF NOT LESS THAN 36 FT FLOW LINE TO FLOW LINE (THIS WIDTH MAY BE REDUCED TO 24 FT IF ALL BUILDINGS FRONTING THE STREET ARE SPRINKLERED) FOR MAIN RESIDENTIAL STREETS, WITH PARKING PERMITTED ON BOTH SIDES OF THE STREET. PRIVATE DRIVE AISLES, DRIVEWAYS, ETC. SHALL BE ALLOWED TO BE REDUCED TO A MINIMUM WIDTH OF 24 FT FLOW LINE TO FLOW LINE WHEN SERVING NO MORE THAN 6 RESIDENTS, AND WHEN ON STREET PARKING IS DISALLOWED. **SNFC 503.2.1 / 503.2.11**
24. ALL FIRE APPARATUS ACCESS ROADS IN COMMERCIAL DEVELOPMENTS AND APARTMENT COMPLEXES SHALL HAVE A MINIMUM UNOBSTRUCTED WIDTH OF NOT LESS THAN 24 FT (FLOW LINE TO FLOW LINE), PROVIDED NO PARKING IS ALLOWED ON EITHER SIDE; 36 FT (FLOW LINE TO FLOW LINE), WITH PARALLEL PARKING ON ONE SIDE, AND 36 FT (FLOW LINE TO FLOW LINE), IF PARALLEL PARKING IS ALLOWED ON BOTH SIDES. THESE WIDTHS MAY BE REDUCED TO 24 FT IF SPRINKLERED. **SNFC 503.2.1.1**
25. A FIRE APPARATUS ACCESS ROAD SHALL BE REQUIRED WHEN ANY PORTION OF AN EXTERIOR WALL OF THE FIRST STORY IS LOCATED MORE THAN 150 FT FROM A FIRE DEPARTMENT VEHICLE ACCESS. THIS DISTANCE COULD BE INCREASED TO 250 FT IF THE BUILDING IS SPRINKLERED. **IFC 503.1.1 / SNFC 503.11**
26. APPROVED SECONDARY FIRE APPARATUS ACCESS SHALL BE PROVIDED FOR 100 OR MORE DWELLING UNITS, ROAD(S) WITH DEAD-ENDS OR WITH A SINGLE POINT OF ACCESS IN EXCESS OF 600 FT, AND FOR ALL COMMERCIAL, INDUSTRIAL, AND MULTI-FAMILY RESIDENTIAL DEVELOPMENTS. **SNFC 503.1.2**
27. ALL DEAD-END FIRE APPARATUS ROADS AND/OR FIRE LANES, PUBLIC OR PRIVATE, IN EXCESS OF 150 FT IN LENGTH SHALL BE PROVIDED WITH AN APPROVED TURN AROUND HAVING A MINIMUM DIAMETER OF 81 FT. **SNFC 503.2.5**
28. ALL FIRE APPARATUS ACCESS ROADS SHALL BE MARKED BY PLACING APPROVED SIGNS AT THE START OF THE DESIGNATED FIRE LANE, ONE SIGN AT THE END OF THE FIRE LANE AND WITH SIGNS AT INTERVALS OF 100 FT ALONG THE DESIGNATED FIRE LANES. SIGNS TO BE PLACED ON BOTH SIDES OF AN ACCESS ROADWAY IF NEEDED TO PREVENT PARKING ON EITHER SIDE. SIGNS TO BE INSTALLED NO HIGHER THAN 10 FT OR LESS THAN 6 FT FROM THE ROADWAY LEVEL. THE CURB ALONG OR ON THE PAVEMENT OR CEMENT (IF NO CURB IS PROVIDED) SHALL BE PAINTED WITH A RED WEATHER RESISTANT PAINT IN ADDITION TO THE SIGNS. **SNFC 503.3**
29. ELECTRICALLY CONTROLLED ACCESS GATES SHALL BE PROVIDED WITH AN APPROVED EMERGENCY VEHICLE DETECTOR/RECEIVER SYSTEM. SAID SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH THE CITY OF LAS VEGAS GUIDELINES FOR AUTOMATIC EMERGENCY VEHICLE ACCESS GATES. **IFC / SNFC 503.6**

CITY OF LAS VEGAS TRAFFIC NOTES

1. ALL CONSTRUCTION SIGNING, BARRICADING, AND TRAFFIC DELINEATION SHALL CONFORM TO THE 'NEVADA WORK ZONE TRAFFIC CONTROL HANDBOOK', LATEST EDITION, AND TO THE 'MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES', LATEST EDITION.
2. THE STREET SIGN CONTRACTOR SHALL OBTAIN STREET NAMES AND BLOCK NUMBERING FROM THE PLANNING DEPARTMENT PRIOR TO CONSTRUCTION.
3. BEFORE ANY WORK IS STARTED IN THE RIGHT-OF-WAY, THE CONTRACTOR SHALL INSTALL ALL ADVANCE WARNING SIGNS FOR THE CONSTRUCTION ZONE, THE CONTRACTOR SHALL INSTALL TEMPORARY STOP SIGNS AT ALL NEW STREET ENCRoACHMENTS INTO EXISTING CITY STREETS WHERE WARRANTED IMMEDIATELY AFTER FIRST GRADING WORK IS ACCOMPLISHED, AND SHALL MAINTAIN SAID SIGNS UNTIL PERMANENT SIGNS ARE INSTALLED.
4. WHEN A DESIGNATED 'SAFE ROUTE TO SCHOOL' IS ENCRoACHED UPON BY A CONSTRUCTION WORK ZONE AND PUBLIC WORKS STAFF IDENTIFIES A NEED FOR STUDENTS TO BE ASSISTED IN THE SAFE CROSSING THROUGH THAT WORK ZONE, THE CONTRACTOR SHALL BE REQUIRED TO PROVIDE A QUALIFIED 'CROSSING GUARD'. THE GUARD SHALL BE PRESENT FOR THE FULL DURATION OF TIME THAT CHILDREN ARE LIKELY TO BE PRESENT.
5. IF THE IMPROVEMENTS NECESSITATE THE OBLITERATION, TEMPORARY OBSTRUCTIONS, TEMPORARY REMOVAL OR RELOCATION OF ANY EXISTING TRAFFIC PAVEMENT MARKING, SUCH PAVEMENT MARKING SHALL BE RESTORED OR REPLACED WITH LIKE MATERIALS TO THE SATISFACTION OF THE CITY TRAFFIC ENGINEER.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND INSTALLING ALL PERMANENT SIGNS SHOWN ON THE PLANS. STREET NAME SIGNS SHALL CONFORM IN THEIR ENTIRETY TO CURRENT CITY STANDARDS. ALL OTHER SIGNS SHALL BE STANDARD SIZE UNLESS OTHERWISE SPECIFIED ON THE PLANS. ALL SIGN POSTS SHALL BE INSTALLED IN ACCORDANCE WITH THE CURRENT CITY STANDARDS.
7. WHEN A PROPOSED STREET LIGHT STANDARD IS LOCATED WITHIN FIVE (5) FEET OF ANY PROPOSED SIGN SHOWN ON THE PLANS TO BE MOUNTED ON A SIGNPOST, THE SIGN SHALL BE MOUNTED ON THE STREET LIGHT STANDARD AND THE SIGNPOST SHALL BE ELIMINATED.
8. ALL PERMANENT TRAFFIC CONTROL DEVICES CALLED FOR HEREON SHALL BE IN PLACE AND IN FINAL POSITION PRIOR TO ALLOWING ANY PUBLIC TRAFFIC ONTO THE PORTIONS OF THE ROAD(S) BEING IMPROVED HEREUNDER, REGARDLESS OF THE STATUS OF COMPLETION OF PAVING OR OTHER OFF-SITE IMPROVEMENTS CALLED FOR BY THESE PLANS.
9. STREET SIGNS AND STOP SIGNS SHALL BE INSTALLED PER CITY STANDARD SPECIFICATIONS FOR PLACEMENT OF STREET NAME SIGNS.
10. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY TRAFFIC CONTROL DEVICES AND FLAGGERS TO ENSURE THE SAFETY OF THE PUBLIC IN OR AROUND THE WORK AREA. THE CONTRACTOR SHALL HAVE A CERTIFIED ATSSA TRAFFIC CONTROL TECHNICIAN OR IMSA WORK ZONE SAFETY SPECIALIST SETUP, MAINTAIN, AND/OR REMOVE ALL TRAFFIC CONTROL DEVICES IN THE CITY OF LAS VEGAS RIGHTS-OF-WAY.
11. WORK IN PUBLIC STREETS, ONCE BEGUN, SHALL BE EXPEDITED TO COMPLETION SO AS PROVIDE MINIMUM INCONVENIENCE TO ADJACENT PROPERTY OWNERS AND TO TRAVELING PUBLIC.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING CITIZENS AREA TRANSIT (C.A.T.) IF THE CONSTRUCTION INTERRUPTS OR RELOCATES A BUS STOP OR HAS AN ADVERSE EFFECT ON BUS SERVICE ON THAT STREET TO ARRANGE FOR TEMPORARY RELOCATION OF STOP.
13. GUARDS SHALL BE OBTAINED BY CONTACTING THE METROPOLITAN POLICE DEPARTMENT SPECIAL EVENTS UNIT (PHONE No. IS 229.3442) WHO WILL PROVIDE OFFICERS PROPERLY TRAINED IN TRAFFIC CONTROL. FEES FOR THE USE OF THESE OFFICERS SHALL BE SET UP BY METRO AND WILL BE PAID BY CONTRACTOR. THE CONTRACTOR IS RESPONSIBLE FOR ALL ARRANGEMENTS WITH METRO.
14. ANY WORK WITHIN 300' OF A SIGNALIZED INTERSECTION WILL BE NIGHT WORK, UNLESS DIRECTED BY THE CITY OF LAS VEGAS TRAFFIC ENGINEER.

LAS VEGAS VALLEY WATER DISTRICT STANDARD NOTES

LVWVD PROJECT #---

1. NO WORK SHALL BEGIN UNTIL THE WATER PLANS HAVE BEEN APPROVED FOR CONSTRUCTION BY THE LVWVD. FOLLOWING WATER PLAN APPROVAL, NOTICE SHALL BE GIVEN TO THE LVWVD COMMUNICATION SUPPORT CENTER (268-7171) TWO (2) WORKING DAYS PRIOR TO THE START OF CONSTRUCTION. FOR FUTURE INSPECTIONS, NOTICE MUST BE GIVEN BY 2:00 P.M. THE BUSINESS DAY PRIOR TO THE REQUESTED LVWVD INSPECTION. WHEN REQUESTING INSPECTIONS, PLEASE REFER TO THE PROJECT # IDENTIFIED ABOVE.
2. ALL WORK SHALL CONFORM TO LVWVD STANDARD PLATES, DRAWINGS, AND SPECIFICATIONS AND TO THE 2010 EDITION OF THE UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR POTABLE WATER SYSTEMS (UDACS).
3. ALL WORK, EXCEPT AS MODIFIED BY THESE PLANS OR BY NOTE 2 ABOVE, SHALL BE DONE IN ACCORDANCE WITH THE MOST RECENT DRAFT OR EDITION OF THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFFSITE IMPROVEMENT, CLARK COUNTY AREA.
4. A SINGLE PIPE MATERIAL SHALL BE USED THROUGHOUT THE PROJECT UNLESS OTHERWISE APPROVED BY THE LVWVD.
5. ALL SERVICE LATERALS TWO (2) INCHES IN DIAMETER AND SMALLER SHALL BE TYPE K COPPER TUBING WITH LVWVD APPROVED SERVICE SADDLES.
6. ALL WATER METER BOXES SHALL BE LOCATED OUTSIDE OF DRIVEWAY AREAS.
7. ALL VALVES SHALL BE LOCATED OUTSIDE OF DRIVEWAYS, VALLEY AND CURB GUTTERS.
8. ALL WATER AND STORM DRAIN OR SANITARY SEWER CROSSINGS SHALL CONFORM TO SECTION 2.22 OF THE 2010 EDITION OF THE UDACS.
9. ALL WATER FACILITIES SHALL BE FILLED, DISINFECTED, PRESSURE TESTED, FLUSHED, FILLED AND AN ACCEPTABLE WATER SAMPLE OBTAINED, PRIOR TO CONNECTION TO THE LVWVD'S DISTRIBUTION SYSTEM.
10. THE CONTRACTOR MUST OBTAIN ALL METERS TWO (2) INCHES AND SMALLER FROM LVWVD CENTRAL STORES. TELEPHONE 268-3152 OR 268-3802 TWO (2) WORKING DAYS PRIOR TO METER PICKUP.
11. ANY INTERRUPTION OF SERVICE MUST BE PERFORMED IN ACCORDANCE WITH UDACS SECTION 3.14.01, AND APPROVED BY THE LVWVD INSPECTION DIVISION PRIOR TO SHUTDOWN. PROPER WRITTEN NOTIFICATION MUST BE GIVEN TO ALL AFFECTED CUSTOMERS.
12. ALL WATER FACILITY CONSTRUCTION MATERIALS USED MUST BE AS LISTED ON THE LVWVD PRE-APPROVED MATERIALS AND MANUFACTURERS LISTING FOR NEW FACILITIES, LATEST REVISION, OR SPECIFICALLY APPROVED ON THESE PLANS.
13. TELEPHONE 'CALL BEFORE YOU DIG' AT '811' OR 1-800-227-2600.
14. THE INSTALLATION OF LAS VEGAS VALLEY WATER DISTRICT (LVWVD) MUNICIPAL WATER FACILITIES WITHIN ALL STREETS IS ASSUMED TO BE IN COMPLIANCE WITH THE UNIFORM STANDARDS, INCLUDING THE PLACEMENT OF ASPHALT PAVING STREET SURFACES. ANY REPAIR WORK DONE BY THE LVWVD TO THE MUNICIPAL WATER FACILITIES WILL INCLUDE THE PLACEMENT OF AN APPROPRIATELY SIZED ASPHALT REPAIR PATCH ON THE STREET SURFACE.

ANY DECORATIVE PAVING SURFACE WITHIN THE STREET IS THE RESPONSIBILITY OF THE OWNER'S ASSOCIATION, OR ANY INDIVIDUAL PROPERTY OWNERS IF NO OWNERS ASSOCIATION IS IN EXISTENCE, OR THE AGENCY HAVING JURISDICTION. DECORATIVE SURFACE MATERIALS PLACED WITHIN THE TEN FOOT EASEMENT ADJUTING A PUBLIC OR PRIVATE STREET, IF DISTURBED BY THE LVWVD DURING THE REPAIR OPERATION OF ITS FACILITIES, WILL BE REPLACED BY THE LVWVD WITH AN APPROPRIATELY SIZED PLAIN FINISH CONCRETE PATCH, AND WILL NOT BE RESPONSIBLE FOR THE RESTORATION OF ANY DECORATIVE PAVING SURFACE WITHIN THE STREET. THE LVWVD WILL NOT ATTEMPT TO MATCH COLOR OR FINISH OF ANY ADJACENT MATERIALS.

CITY OF LAS VEGAS SEWER NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS AND THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA, AS AMENDED. IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO BE AWARE OF THE CONTENTS OF THE ABOVE SPECIFICATIONS.
2. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PERFORM CONSTRUCTION AS PER PLANS. ANY ADDITIONS, DELETIONS, OR CHANGES SHALL FIRST MEET WITH THE APPROVAL OF THE CITY ENGINEER.
3. CHISEL 'S' OR 'G' IN CURBS WHERE SEWER OR GAS LATERALS PASS UNDER THE CURB.
4. POLYVINYL (PVC) SEWER PIPE SHALL MEET ASTM D-3034 SDR 35 SPECIFICATIONS, INSTALLED WITH SAND BEDDING AND BACK FILL OF TYPE II AGGREGATE BASE.
5. ALL MANHOLES IN PAVED STREETS 80' RW AND LARGER, SHALL HAVE CONCRETE COLLARS. STREETS LESS THAN EIGHTY (80) FOOT RW WILL REQUIRE RETROFIT IF PAVING DOES NOT CONFORM TO CITY STANDARDS AT THE MANHOLE.
6. TEE SADDLES SHALL BE USED TO CONNECT SEWER LATERALS TO EXISTING MAIN LINES UP TO TWELVE INCH (12") DIAMETER. CONNECTIONS TO FIFTEEN INCH (15") OR LARGER MAINS SHALL REQUIRE SPECIAL PROCEDURES. IN LINE 'Y'S' SHALL BE USED ON LINES TWELVE INCHES (12") OR ABOVE.
7. WATER MAINS SHALL BE PROTECTED IN ACCORDANCE WITH LVWVD STANDARDS WHENEVER A SEWER MAIN CROSSES OVER A WATER MAIN OR THE SEWER IS LESS THAN EIGHTEEN INCH (18") UNDER A WATER MAIN.
8. ALL CONTRACTORS INSTALLING SEWER MAINS THAT WILL BE UNDER THE JURISDICTION OF THE CITY OF LAS VEGAS MUST BE STATE OF NEVADA CLASS 'A' CONTRACTORS.
9. THE CITY OF LAS VEGAS WILL NOT ACCEPT ANY SEWER MAINS WHICH HAVE A VERTICAL DEFLECTION OF MORE THAN ONE TENTH (0.1) OF A FOOT FROM THE APPROVED CONSTRUCTION PLANS AT ANY LOCATION. SEWER MAINS FOUND TO EXCEED THIS TOLERANCE WILL HAVE TO BE REPAIRED OR REMOVED OR REPLACED TO THE SATISFACTION OF THE CITY ENGINEER PRIOR TO ACCEPTANCE BY THE CITY OF LAS VEGAS.
10. INSTALLATION OF CURVED SEWER REQUIRES THE USE OF C-900 PVC PIPE WHICH ALLOWS FOR PIPE DEFLECTION AT THE JOINTS.

REVISED 04/05/10

CITY OF LAS VEGAS GRADING NOTES

1. IN THE EVENT THAT ANY UNFORSEEN CONDITIONS NOT COVERED BY THESE NOTES ARE ENCOUNTERED DURING GRADING OPERATIONS, THE OWNER/ENGINEER SHALL BE IMMEDIATELY NOTIFIED FOR DIRECTION.
2. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PERFORM ALL NECESSARY CUTS AND FILLS WITHIN THE LIMITS OF THIS PROJECT AND THE RELATED OFF-SITE WORK, SO AS TO GENERATE THE DESIRED SUBGRADE, FINISH GRADES AND SLOPES SHOWN.
3. CONTRACTOR SHALL TAKE RESPONSIBILITY FOR ALL EXCAVATION, ADEQUATE SHORING SHALL BE DESIGNED AND PROVIDED BY THE CONTRACTOR TO PREVENT UNDERMINING OF ANY ADJACENT FEATURES OR FACILITIES AND/OR CAVING OF THE EXCAVATION.
4. THE CONTRACTOR IS WARNED THAT AN EARTHWORK BALANCE, WAS NOT NECESSARILY THE INTENT OF THIS PROJECT. ANY ADDITIONAL MATERIAL REQUIRED OR LEFTOVER MATERIAL FOLLOWING EARTHWORK OPERATIONS BECOMES THE RESPONSIBILITY OF THE CONTRACTOR.
5. THE GRADING CONTRACTOR IS RESPONSIBLE TO COORDINATE WITH THE OWNER TO PROVIDE FOR THE REQUIREMENTS OF THE PROJECT STORM WATER POLLUTION PREVENTION PLAN (SWPPP) AND ASSOCIATED PERMIT.
6. CONTRACTOR SHALL GRADE TO THE LINES AND ELEVATIONS SHOWN ON THE PLANS WITHIN THE FOLLOWING HORIZONTAL AND VERTICAL TOLERANCES AND DEGREES OF COMPACTION, IN THE AREAS INDICATED:
- |                           | HORIZONTAL | VERTICAL    | COMPACTION       |
|---------------------------|------------|-------------|------------------|
| A. PAVEMENT AREA SUBGRADE | 0.1" +/-   | +0.070-0.1" | SEE SOILS REPORT |
| B. ENGINEERED FILL        | 0.5" +/-   | +0.170-0.1" | SEE SOILS REPORT |
- COMPACTION TESTING WILL BE PERFORMED BY THE OWNER OR HIS REPRESENTATIVE.
- ALL CUT AND FILL SLOPES SHALL BE PROTECTED UNTIL EFFECTIVE EROSION CONTROL HAS BEEN ESTABLISHED.
8. THE USE OF POTABLE WATER WITHOUT A SPECIAL PERMIT FOR BUILDING OR CONSTRUCTION PURPOSES INCLUDING CONSOLIDATION OF BACKFILL OR DUST CONTROL, IS PROHIBITED. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS FOR CONSTRUCTION WATER.
9. THE CONTRACTOR SHALL MAINTAIN THE STREETS, SIDEWALKS AND ALL OTHER PUBLIC RIGHT-OF-WAY IN A CLEAN, SAFE AND USABLE CONDITION. ALL SPILLS OF SOIL, ROCK OR CONSTRUCTION DEBRIS SHALL BE PROMPTLY REMOVED FROM ALL THE PUBLICLY OWNED PROPERTY DURING CONSTRUCTION AND UPON COMPLETION OF THE PROJECT. ALL ADJACENT PROPERTY, PRIVATE OR PUBLIC SHALL BE MAINTAINED IN A CLEAN, SAFE AND USABLE CONDITION.
10. IN THE EVENT THAT ANY TEMPORARY CONSTRUCTION ITEM IS REQUIRED THAT IS NOT SHOWN ON THESE DRAWINGS, THE OWNER AGREES TO PROVIDE AND INSTALL SUCH ITEM AT HIS OWN EXPENSE AND AT THE DIRECTION OF THE CITY ENGINEER. TEMPORARY CONSTRUCTION INCLUDES DITCHES, BERMS, ROAD SIGNS AND BARRICADES, ETC.

BENCHMARK

PROJECT DATUM: NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVOD88)

CITY OF LAS VEGAS BENCHMARK: 2LV0013NE6 (REVISED 2008)

NAVOD88 ELEVATION: 679.739 METERS (2230.11 FEET)

FOUND RIVET AND PLATE IN THE TOP OF CURB ON THE WEST SIDE OF ROUND AT 3101 RANCHO

BASIS OF BEARING

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

LINEAR UNIT: US SURVEY FOOT (FT/US)

DATUM (REFERENCE FRAME): NAD 83 (2011) EPOCH 2010.00

SYSTEM: NEVADA COORDINATE REFERENCE SYSTEM (NCRS)

ZONE: LAS VEGAS

PROJECTION: TRANSVERSE MERCATOR

STANDARD PARALLEL AND LATITUDE OF GRID ORIGIN: 36°15'00"N

LONGITUDE OF CENTRAL MERIDIAN: 114°58'00"W

NORTHING AT GRID ORIGIN: 200,000.000 M (656,166.6667 FT/US)

EASTING AT CENTRAL MERIDIAN: 100,000.000 M (328,083.3333 FT/US)

SCALE FACTOR ON CENTRAL MERIDIAN: 1.0001 (EXACT)

I CERTIFY THAT THE ONLY DEVIATIONS FROM THE DESIGN AND CONSTRUCTION STANDARDS THAT ARE APPROVED BY THE COWRD ARE LISTED BELOW:

- NONE

*William J. Meyer* 3/8/18  
15745, P.E. LICENSE # WILLIAM J. MEYER DATE

ABBREVIATIONS

|      |                                 |        |                                        |
|------|---------------------------------|--------|----------------------------------------|
| FF   | FINISH FLOOR                    | DI     | DROP INLET                             |
| FG   | FINISH GRADE                    | BFE    | BASE FLOOD ELEVATION                   |
| FL   | FLOW LINE                       | CCUSD  | CLARK COUNTY UNIFORM STANDARD DRAWINGS |
| TC   | TOP OF CURB                     | SW     | SIDEWALK                               |
| TRC  | TOP OF ROLL CURB                | TSW    | TOP OF SIDEWALK                        |
| EOP  | EDGE OF ASPHALT PAVEMENT        | INT    | INTERSECTION                           |
| FUT  | FUTURE                          | D.G.   | DESIGN GRADE                           |
| EX   | EXISTING                        | C/L    | CENTER LINE                            |
| VG   | VALLEY GUTTER                   | O/C    | OFFSET CROWN                           |
| NG   | NATURAL GROUND                  | BC     | BACK OF CURB                           |
| H.P. | HIGH POINT                      | BCR    | BEGIN CURB RETURN                      |
| L.P. | LOW POINT                       | BCL    | BACK OF CURB LENGTH                    |
| SSMH | SEWER MANHOLE                   | TF     | TOP OF FOOTING                         |
| WTR  | WATER LINE                      | GB     | GRADE BREAK                            |
| SD   | STORM DRAIN                     | PC     | POINT OF CURVATURE                     |
| RPC  | REINFORCED CONCRETE PIPE        | TPW    | TOP OF PLANTER WALL                    |
| PT   | POINT OF TANGENCY               | TRW    | TOP OF RETAINMENT WALL                 |
| PRC  | POINT OF REVERSE CURVATURE      | TOP    | TOP OF CHANNEL/SCARP                   |
| PCC  | POINT OF COMPOUND CURVATURE     | TOE    | TOE OF CHANNEL/SCARP                   |
| BVC  | BEGIN VERTICAL CURVE            | TOB    | TOP OF BOX                             |
| MVC  | MID-POINT OF VERTICAL CURVE     | PP     | POWER POLE                             |
| END  | END VERTICAL CURVE              | TRANS. | TRANSITION                             |
| PRVC | POINT OF REVERSE VERTICAL CURVE | RET.   | RETAINMENT                             |
| R/W  | RIGHT-OF-WAY                    |        |                                        |

LEGEND

| DESCRIPTION               | PROPOSED   | EXISTING     | FUTURE       |
|---------------------------|------------|--------------|--------------|
| CONTOUR (5' INTERVAL)     | ---2450--- | ---(2450)--- | ---[2450]--- |
| CONTOUR (1' INTERVAL)     | ---        | ---          | ---          |
| EDGE OF PAVEMENT          | ---        | ---          | ---          |
| SAW CUT                   | ---        | ---          | ---          |
| RETAINING WALL            | ---        | ---          | ---          |
| SCREEN WALL               | ---        | ---          | ---          |
| RIGHT OF WAY              | ---        | ---          | ---          |
| CENTER LINE               | ---        | ---          | ---          |
| BACK OF CURB              | ---        | ---          | ---          |
| LIP OF GUTTER             | ---        | ---          | ---          |
| FACE OF CURB              | ---        | ---          | ---          |
| SIDEWALK                  | ---        | ---          | ---          |
| UNIT BOUNDARY LINE        | ---        | ---          | ---          |
| UNIT BOUNDARY / ROW       | ---        | ---          | ---          |
| PROPERTY LINE             | ---        | ---          | ---          |
| SLOPE AND FLOW DIRECTION  | 1.00%      | 1.00%        | 1.00%        |
| SCARP AREA                | ---        | ---          | ---          |
| MATCHLINE                 | ---        | ---          | ---          |
| SIDEWALK RAMP             | ---        | ---          | ---          |
| SIGHT VISIBILITY ZONES    | ---        | ---          | ---          |
| PAVED ROAD                | ---        | ---          | ---          |
| PAVEMENT REMOVAL          | ---        | ---          | ---          |
| WATER UNDER 18"           | ---        | ---          | ---          |
| WATER 18" & OVER          | ---        | ---          | ---          |
| SANITARY SEWER UNDER 18"  | ---        | ---          | ---          |
| SANITARY SEWER 18" & OVER | ---        | ---          | ---          |
| STORM SEWER               | ---        | ---          | ---          |
| FIRE HYDRANT              | •          | ◊            | •            |
| SANITARY SEWER MAN HOLE   | ⊙          | ⊙            | ⊙            |
| CLEAN OUT                 | •          | •            | •            |
| STORM DRAIN MAN HOLE      | ⊙          | ⊙            | ⊙            |

ESTIMATE OF QUANTITIES

| ESTIMATED UTILITY QUANTITIES | PUBLIC | PRIVATE |
|------------------------------|--------|---------|
| FIRE HYDRANT ASSEMBLY ...    | __ LF  | __ LF   |
| 8" PVC WATER                 | __ LF  | __ LF   |
| 8" DIP WATER                 |        |         |
|                              |        |         |
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ESTIMATED GRADING QUANTITIES

|                            |      |      |
|----------------------------|------|------|
| 2" ASPHALT CONCRETE PAVING | _ SY | _ SY |
| TYPE II GRAVEL BASE        | _ CY | _ CY |
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# CRYSTAL PARK APARTMENTS

APN: 138-13-512-001

CITY OF LAS VEGAS  
STATE OF NEVADA

DEVELOPED BY:

EAB INVESTMENT COMPANY

3065 N. RANCHO #130  
LAS VEGAS, NV 89113

**OWNER**  
EAB INVESTMENT COMPANY  
3065 N. RANCHO #130  
LAS VEGAS, NV 89113

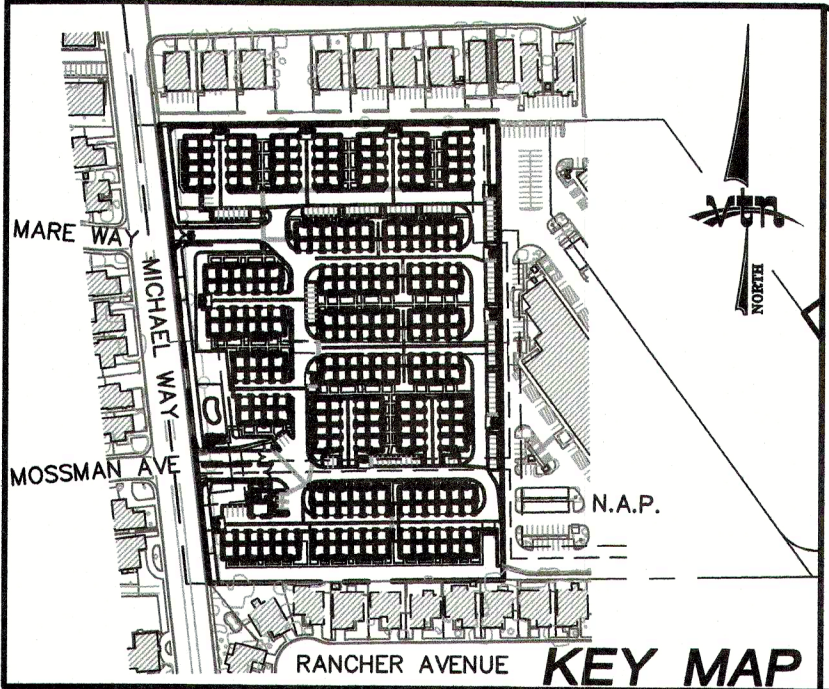
**DEVELOPER**  
EAB INVESTMENT COMPANY  
3065 N. RANCHO #130  
LAS VEGAS, NV 89113

**ENGINEERING FIRM**  
VTN  
2727 SOUTH RAINBOW BOULEVARD  
LAS VEGAS, NEVADA 89146-5148  
PH. (702) 873-7550  
FAX (702) 362-2597



## LOCATION MAP

N.T.S.



KEY MAP

THESE PLANS AND THE DESIGN CRITERIA CONTAINED WITHIN THESE PLANS ARE BASED UPON THE INFORMATION PRESENTLY KNOWN BY THE ENGINEER AND INTENDED SOLELY AS A GENERAL GUIDELINE FOR CONSTRUCTION. ALL CONSTRUCTION SHALL BE IN CONFORMANCE WITH ALL APPLICABLE LOCAL, STATE AND FEDERAL STATUTES, LAWS, CODES, REGULATIONS AND ORDINANCES, INCLUDING BUT NOT LIMITED TO THE FEDERAL FAIR HOUSING AMENDMENTS ACT, AMERICANS WITH DISABILITIES ACT, THE ARCHITECTURAL BARRIERS ACT AND ANY APPLICABLE UNIFORM STANDARDS, SPECIFICATIONS OR DRAWINGS. THE PERSON OR ENTITY PERFORMING THE CONSTRUCTION SHALL BE SOLELY RESPONSIBLE TO MAKE SURE CONSTRUCTION IS IN CONFORMANCE WITH ALL LOCAL, STATE AND FEDERAL STATUTES, LAWS, CODES, REGULATIONS, STANDARDS, GUIDELINES AND ORDINANCES AND FURTHER, IS IN CONFORMANCE WITH ANY APPLICABLE DESIGN CRITERIA, INCLUDING BUT NOT LIMITED TO SOILS REPORTS, TRAFFIC STUDIES, GEOTECHNICAL REPORTS, ARCHITECTURAL PLANS AND SPECIFICATIONS, DRAINAGE PLANS OR STUDIES AND ANY OTHER CRITERIA, STANDARDS OR REQUIREMENTS LISTED IN THE PLANS OR THE GENERAL NOTES RELATED TO THESE PLANS OR PROVIDED BY ANYONE IN REFERENCE TO THIS PROJECT.

## APPROVALS

**CITY ENGINEER** ALLEN PAVELKA, P.E. # 9029

APPROVAL OF THESE PLANS BY THE CITY ENGINEER IS LIMITED TO THOSE IMPROVEMENTS CONSTRUCTED IN THE DEDICATED RIGHT-OF-WAY AND/OR DEDICATED EASEMENTS. THIS APPROVAL DOES NOT AUTHORIZE THE CONSTRUCTION OF ANY IMPROVEMENTS THAT DEVIATE FROM ADOPTED STANDARDS AND/OR SPECIFICATIONS EXCEPT THOSE SPECIFICALLY LISTED UNDER DEVIATIONS FROM STANDARD. THE ENGINEER SHALL RESOLVE ANY DEVIATION OTHER THAN THOSE LISTED IN DEVIATIONS FROM STANDARDS IN FAVOR OF THE UNIFORM STANDARD DRAWINGS AND SPECIFICATIONS CLARK COUNTY AREA NEVADA.

**CHRIS KNIGHT, DIRECTOR OF BUILDING & SAFETY** DATE

THIS PLAN MEETS THE APPLICABLE STANDARDS OF THE PLANNING AND DEVELOPMENT DEPARTMENT

**CENTRAL TELEPHONE COMPANY d/b/a CENTURYLINK** DATE

"THE AFFIXED CENTURY LINK NEVADA APPROVAL DOES NOT ASSUME OR GUARANTEE LIABILITY FOR KNOWN OR UNKNOWN CONFLICTS WITH EXISTING OR PROPOSED IMPROVEMENTS. RESOLUTION OF ANY CONFLICT WILL BE ACCOMPLISHED PURSUANT TO LOCAL ORDINANCES, NEVADA REVISED STATUTES AND/OR PUBLIC UTILITY COMMISSION RULES AND REGULATIONS."

**NV ENERGY** DATE

NV ENERGY ACKNOWLEDGES THAT WE HAVE RECEIVED YOUR PLANS AND WILL PROVIDE SERVICE TO ALL ELECTRICAL NEEDS ASSOCIATED WITH THIS PROJECT. NVENERGY RESERVES THE RIGHT TO ADDRESS ANY EXISTING OR FUTURE CONFLICTS ONCE THE FINAL DESIGN IS COMPLETED. THE NEW SERVICE AND THE RESOLUTION OF ANY CONFLICTS WILL BE ACCOMPLISHED PURSUANT TO THE NEVADA PUBLIC UTILITY COMMISSION'S RULES AND REGULATIONS.

**COX COMMUNICATIONS LAS VEGAS, INC.** DATE

**SOUTHWEST GAS CORPORATION** DATE

**LAS VEGAS FIRE & RESCUE** DATE

**LAS VEGAS VALLEY WATER DISTRICT**

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER

PROJECT: \_\_\_\_\_ DATE: \_\_\_\_\_

SHEETS:

## FIRE DEPARTMENT APPROVAL

APPROVAL BY THE FIRE DEPARTMENT HAVING JURISDICTION IS REQUIRED PRIOR TO OBTAINING FINAL APPROVAL FROM THE LVWVD.

## SHEET INDEX

| SHEET # | SHEET | DESCRIPTION    |
|---------|-------|----------------|
| 1       | CV    | COVER SHEET    |
| 2       | NT    | NOTE SHEET     |
| 9       | GR1   | GRADING PLAN 1 |
| 10      | GR2   | GRADING PLAN 2 |
| 11      | GR3   | GRADING PLAN 3 |
| 12      | GR4   | GRADING PLAN 4 |
| 13      | GR5   | GRADING PLAN 5 |
| 14      | GR6   | GRADING PLAN 6 |
| 15      | DT1   | DETAIL SHEET 1 |
| 16      | DT2   | DETAIL SHEET 2 |
| 17      | DT3   | DETAIL SHEET 3 |

## BENCHMARK

PROJECT DATUM: NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)  
CITY OF LAS VEGAS BENCHMARK: 2LV0013NE6 (REVISED 2008)  
NAVD88 ELEVATION: 679.739 METERS (2230.11 FEET)  
FOUND RIVET AND PLATE IN THE TOP OF CURB ON THE WEST SIDE OF RANCHO AT 3101 RANCHO

## BASIS OF BEARING

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS ZONE, NORTH AMERICAN DATUM OF 1983, SAND MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.  
LINEAR UNIT: US SURVEY FOOT (FTUS)  
DATUM (REFERENCE FRAME): NAD 83 (2011) EPOCH 2010.00  
SYSTEM: NEVADA COORDINATE REFERENCE SYSTEM (NCRS)  
ZONE: LAS VEGAS  
PROJECTION: TRANSVERSE MERCATOR  
STANDARD PARALLEL (AND LATITUDE OF GRID ORIGIN): 36°15'00"N  
LONGITUDE OF CENTRAL MERIDIAN: 114°58'00"W  
NORTHING AT GRID ORIGIN: 200,000,000 M (656,166,667 FTUS)  
EASTING AT CENTRAL MERIDIAN: 100,000,000 M (328,083,333 FTUS)  
SCALE FACTOR ON CENTRAL MERIDIAN: 1.0001 (EXACT)

|                                                                                                                                                                            |                     |                         |                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-------------------------|---------------------|
| EAB INVESTMENT COMPANY<br>3065 N. RANCHO #130<br>LAS VEGAS, NV 89113                                                                                                       |                     | LAS VEGAS, NV           |                     |
| 2727 SOUTH RAINBOW BOULEVARD<br>LAS VEGAS, NEVADA 89146-5148<br>PH. (702) 873-7550 FAX (702) 362-2597 WEB WWW.VTNV.COM<br>CONSULTING ENGINEERS • PLANNERS • LAND SURVEYORS |                     | CRYSTAL PARK APARTMENTS |                     |
| DRAWN BY:<br>KCH                                                                                                                                                           | DESIGNED BY:<br>DEH | CHECKED BY:<br>NVA      | PROJECT NO:<br>7844 |
| DATE: 04/25/2017                                                                                                                                                           |                     | DATE: 08/14/2017        |                     |
| SCALE: N/A                                                                                                                                                                 |                     | SCALE: N/A              |                     |
| SHEET<br>CV                                                                                                                                                                |                     | SHEET<br>CV             |                     |
| 1 OF 23 SHEETS                                                                                                                                                             |                     | 1 OF 23 SHEETS          |                     |
| DRAWING NO.                                                                                                                                                                |                     | DRAWING NO.             |                     |

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY.

**CALL BEFORE YOU DIG**

1-702-227-2929

Call before you Dig

Avoid cutting underground utility lines. It's costly.

**811**

1-800-227-2600  
OR  
1-702-455-8000  
CLARK COUNTY TRAFFIC OPERATIONS

Call before you Dig

Avoid cutting underground utility lines. It's costly.

**811**

1-702-455-8000  
OR  
1-702-227-2600  
CLARK COUNTY TRAFFIC OPERATIONS